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The FAO's vision on fisheries management

Dr Moritaka Hayashi, Assistant Director-General (Fisheries) of FAO, discussed various aspects of fisheries management during a recent interview in Rome with Dr Kee-Chai Chong, Programme Coordinator of BOBP. Part 1 of this two-part interview is excerpted in the pages that follow.

The FAO's vision on fisheries management

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Dr Hayashi, who joined the FAO in Rome in 1997 as Assistant Director-General of the Department of Fisheries, is a specialist in law and international affairs. He was Legal Officer with the United Nations in New York from 1971 to 1979. He then joined Japan's Foreign Ministry but remained in New York as Minister with Japan's Mission to the United Nations for eight years. In 1988, he rejoined the UN as Principal Officer and later as Director of the Division for Ocean Affairs and the Law of the Sea. He held this post till 1997.

As FAO's top official in fisheries, Dr Hayashi brings to bear his expertise in legal affairs and his experience in negotiating various global agreements in fisheries.

Chong: *What are your immediate priorities as ADG of FAO?*

Hayashi: Some of the issues we must tackle immediately relate to over-investment and over-capacity in fisheries which lead to over-fishing. There is also the problem of excessive by-catch, leading to discards. FAO figures indicate that about 20 million tonnes per year are lost on account of discard of bycatch. This is a serious waste of resources at a time when we need to utilize whatever is produced.

In seeking solutions to these problems, we should not rely exclusively on market forces. History shows that overfishing leads to further over-capitalization in industrial fisheries. It also generates excessive pressures on small-scale fisheries, because of a headlong pursuit of higher harvests. This has led to the collapse of some fisheries and some stocks.

We should learn from history and practise self-restraint in goals and targets, investment and capture. Such self-restraint is essential to promote the long-term sustainability of fisheries, also to ensure the livelihood of fishermen.

I am glad that these are also the current goals of the Bay of Bengal Programme, which has been doing excellent work for the past 18 years.

Q: *You have been instrumental in bringing about several global agreements in fisheries. What is the significance of these agreements?*

Hayashi: The foundation for the current international "charter" in fisheries was established in 1982 through UNCLOS, the United Nations Convention on the Law of the Sea. This agreement is legally binding. It follows the introduction of EEZs or exclusive economic zones by several nations during the 1970s. These EEZs embrace some 90% of the world's marine fisheries. UNCLOS gave coastal States rights and responsibilities for managing and using fishery resources within their EEZs. Thus the Convention established a new legal regime for the world's marine fisheries.

In 1993, the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks was convened. The FAO provided important technical back-up to the conference, which adopted in 1995 a new agreement on conservation and management of these stocks. In the meantime, the FAO Conference adopted in November 1993 the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. These Agreements aim at facilitating the implementation of, or further elaborating on some of the basic provisions of UNCLOS.

Another important, albeit not legally binding, agreement is the global Code of Conduct for Responsible Fisheries, adopted by the FAO Conference in 1995. It grew out of the discussions at the Committee of Fisheries in 1991 and the International Conference on Responsible Fishing, held in Cancun, Mexico, in 1992, to address the problem of uncontrolled exploitation of fisheries resources.

The Code sets out principles and international standards of behaviour for responsible practices. The idea was to help ensure the effective conservation, management and development of living aquatic resources in a sustainable manner. The Code is directed at members and non-members of FAO, fishing entities, sub-regional, regional and global organizations.

Not all elements of the Code are applicable to all States in all circumstances. But the Code is an important source of guidance to everyone concerned with sustainable development and management of world fisheries.

These four agreements are instruments that form a comprehensive basis for further international co-operation and national action. In order to improve the current serious situation confronting world fisheries and aquaculture, all countries should observe and implement these agreements.

Q: *Do member-nations have sufficent information and knowledge to manage their fisheries?*

Hayashi: Information and knowledge are the basis for sound judgment on fisheries management. Hard data are needed, but they are quite sparse. More information on various aspects of fisheries is certainly needed in many parts of the world. Many countries,particularly in the developing world, do not have sufficient knowledge on good management. FAO is doing a great deal of work to improve the situation. But a lot more must be done to assist these countries in need. It is unfortunate that funds from donors in this area have been decreasing.

Q: *What is your view on the punitive approach to ensure fisheries compliance?*

Hayashi: The punitive approach should be secondary - not only in fisheries, but also in other areas of law enforcement. The primary emphases should be on voluntary compliance. The preventive approach should precede the punitive approach. I'm glad to note that the Bay of Bengal Programme recently held a successful regional workshop on the Precautionary Approach to Fisheries Management.

Simply put, the preventive approach says "Don't wait for evidence of overfishing to take conservation and management actions." It should be an integral part of fisheries practice-- on the part of government, institutions, fishermen. It needs people's participation to succeed.

Q: *What role do you envisage for FAO regional fishery bodies?*

Hayashi: I think FAO member-governments should look at these bodies as fora for discussing problems of common concern and management of common resources.

They should also serve as means for assisting one another— to acquire new technologies, to become more competent in research and management, to become more self-reliant.

The regional fishery bodies should be used to bring fisheries management and development to the centre-stage of government planning, policy-making and resource allocation.

How effective these bodies are will depend on how strong the political commitment of member-nations is to implement fisheries management and provide technical and financial support as appropriate.

Q: *Aquaculture was once held out as the hope of the future. Today it is under attack from environmentalists and others. What are the prospects for sustainable aquaculture in the future?*

Hayashi: Aquaculture is one of the fastest growing food production systems in the world. The bulk of current output is by developing countries. While capture fisheries seems to have stabilized around 85-90 million tons per year, aquaculture has expanded rapidly in recent years.

The vast majority of aquaculture practices has led to significant social and nutritional benefits. But there have been some social and environmental concerns, and these should be energetically addressed by those practising aquaculture as well as by planners and fisheries authorities.

To be sustainable, scientific practices should be followed – in culture, feeds, fry capture, water exchange practices, soil management. The FAO has brought out a booklet on aquaculture development under the series "FAO technical guidelines for responsible fisheries" (No. 5) The booklet provides some help in this direction.

I believe that aquaculture can still make a great contribution to food security and economic benefits if it is conducted in an environmentally sound and sustainable manner.

(To be continued)

"More information on various aspects of fisheries is needed in many parts of the world". This vallam fishery in Adirampattinam, Tamil Nadu, is an example.

BOBP in the Field

Mapping fishing areas in Kanniyakumari

A significant activity begins in 44 fishing villages of Kanniyakumari district, Tamil Nadu, in February 1998: a survey of fishermen. A two-member local team in each village, equipped with a map and a questionnaire, will interview the three main groups of fishermen in the village – users of *kattumarams, vallams* and small trawlers. (Not all three groups exist in every village.) The data obtained will help determine who is fishing for what, when, where, and how much. This in turn will make possible maps of fishing areas in Kanniyakumari district.

Explaining the rationale of the activity, Dr Kee-Chai Chong, Director of BOBP, says "Many resource conflicts have erupted in the past in Kanniyakumari district among the three fishermen groups — because they apparently fish for the same resource at the same place at the same time, using different fishing gear. To resolve these conflicts, one needs detailed and reliable data, and maps based on the data. The maps can highlight where conflicts are likely to occur. Measures can then be jointly discussed by the three fishermen groups to prevent further tension. Such maps may even show areas that fishermen have overlooked ..."

Ms Barbara Bierhuizen, BOBP's Geographical Information Systems (GIS) Associate Professional Officer (APO), says "The survey will make possible a database and a GIS. These would serve as tools to map fishing areas or patterns. For example, we could create a map of shrimp fishing areas during the shrimp season targeted by *kattumaram, vallam* and boat fishermen. We could prepare any map as needed on the interaction between two or more of the following factors — species, gears, locations and seasons.

"How reliable or accurate any map is depends on how good is the data obtained," says Ms Bierhuizen. Training was provided on interviews and data collection to 56 persons who will do the interviews in Kanniyakumari district. They were selected by the local Parish priests of the 40 villages. The training was provided by Ms Bierhuizen and Mr Rene Verduijn, Fishery Resource Economist (APO), at Nagercoil and Colachel during a recent visit to the district.

"The maps that result may not be scientifically rigorous, but they would be useful and indicative of resource use patterns. They would also show overlaps in fishing areas by the three groups," says Ms Bierhuizen.

A second survey has also been initiated -- on infrastructure needs in every coastal village of Kanniyakumari district. It will give an idea of the current status of infrastructure, and the felt needs and priorities of the population, concerning land availability, housing, health care, sanitation, roads, clean drinking water, electricity, telephones, schools.

This survey is a follow-up to the various stakeholder consultations held by BOBP over the past year in Kanniyakumari district. During these consultations, participants identified a number of needs and concerns relating to the infrastructure (see article on pages 9-12).

The Secretary of Fisheries, Tamil Nadu, suggested that information on such needs and concerns be obtained for every village, to facilitate action by the government.

Says Mr Rene Verduijn "The two-member team that is to conduct the fishing areas survey will also collect data for the infrastructure survey. But the *modus operandi* will be slightly different. For this survey, the team will hold joint meetings with groups of villagers – men, women and children – to elicit their views on infrastructure needs and get them listed in order of priority."

The results of both surveys will be presented at a workshop to be called by the Secretary of Fisheries, which will be attended by agriculture and public works officials besides representatives from the Department of Fisheries. The workshop will propose a plan of action aimed at sustainable fisheries in Kanniyakumari district and better living conditions for the coastal population.

Task Force Proposed to Manage Ornamental Fisheries in Sri Lanka

A Cabinet Task Force on Conservation and Management of Critical Aquatic Habitats (COMCAH) was proposed at a meeting held on Janury 8, 1998, to discuss management of ornamental fisheries.

The meeting was convened by the Secretary to the Ministry of Fisheries and Aquatic Resources Development (MFARD). The Senior Adviser to MFARD, Mr Henry Gunawardene, presided. Fifteen government agencies concerned with ornamental fisheries, and representatives from other stakeholder interests, took part.

The meeting discussed future action on the problems of ornamental fisheries on the basis of a presentation by BOBP. Participants agreed that the ornamental fish sector had to be looked at in a holistic manner – examining the resources, the habitats and the human pressures on the habitats. Managing the sector was possible only through a three-pronged strategy – raising awareness on all fronts; participation of all stakeholders in evolving, agreeing to and implementing management plans; and effective enforcement of regulations. Research should be promoted to understand the sector better, and generate information to help management decisions.

The meeting agreed that given the complexity of ornamental fisheries, no single government agency could manage it. The meeting proposed that the Minister should take up the matter with the Cabinet and suggest a high-level task force to evolve management plans and coordinate implementation. COMCAH should include senior decision-makers from the government agencies concerned, as well as from ornamental fisheries. It should be empowered to establish subgroups to address such issues as management of the ornamental sector and management of critical aquatic habitats.

The Task Force should consult all stakeholders, evolve a national policy on conservation and sustainable management of critical aquatic habitats, and prepare precautionary management plans within three months for presentation to the government. These plans should be periodically reviewed and updated. COMCAH should be empowered to oversee the actions of concerned stakeholder agencies.

The meeting prepared a note on the deliberations, to be handed over to the Minister through Mr Gunawardene.

Meanwhile, several ideas have emerged from the various stakeholder consultations on ornamental fisheries conducted by DFAR with BOBP support. These include initiatives for providing insurance coverage to divers, a pension scheme for divers and fishermen, a licensing scheme for divers and collectors, a scheme to facilitate access to credit for purchase of diving equipment. These are in various stages of implementation. The ordinance to ban or restrict the export of certain species of ornamental fish has been submitted to the Cabinet for approval and publication in the national gazette.

BOBP now on the Worldwide Web!

You may now access BOBP by clicking on Internet, the worldwide computer system that links several million people through 30,000 networks in some 100 countries.

BOBP has had its own website on the Internet (located on FAO Rome's server) from November 1997. The site provides a general overview of BOBP and its activities in member countries, gives addresses of member-country officials who coordinate with BOBP, reproduces selected articles from *Bay of Bengal News,* and contains a list of BOBP publications since 1979.

This is the basic structure of the web page. Additional information can be provided on request to meet any specific need; BOBP welcomes suggestions and requests from individuals or institutions to make the web page more useful. One of the aims of BOBP is that member-countries should share ideas and experiences on fisheries management, so that everyone learns from from each other. Internet can be a very useful tool in this process.

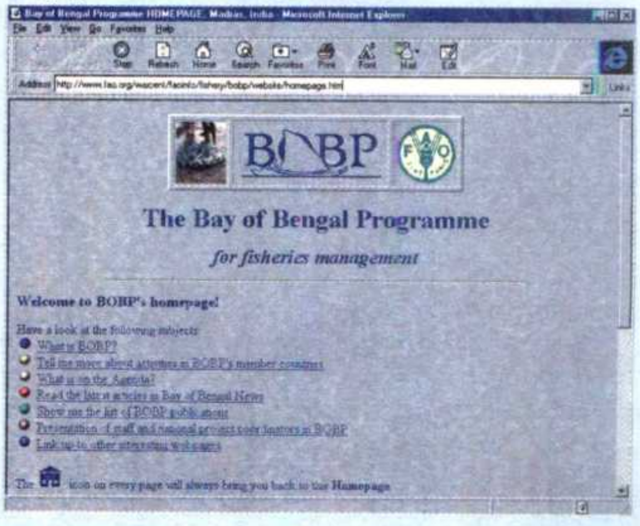
The uniqueness of Internet lies in its huge mass of interactive information from anywhere in the world. Users could access the websites of many organisations, browse libraries to look for interesting articles, and use E-mail to communicate amongst themselves. Thousands of special-interest mailing lists are active on Internet. You may join them if you like, and exchange messages with others all over the world. It is believed that by 2000 A.D., some 200 million people will be part of the Internet family.

BOBP's website address:

http://www.fao.org/waicent/faoinfo/fishery/bobp/website/homepage.htm

For more information contact Ms Barbara Bierhuizen at bobpkcc@md2.vsnl.net.in

Image from BOBP's Internet Website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The Bay of Bengal Programme

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Parliamentarians Consider Food and Livelihood Security Issues of Coastal Bangladesh

by Rathin Roy

Parliamentarians from coastal areas of Bangladesh, and senior officials from fisheries and other departments, met recently in Dhaka. Their agenda: to discuss food and livelihood security of the peoples of coastal Bangladesh. "The door has been opened for a new era in the development of coastal areas of Bangladesh," says the author. Here's a brief report about what the meeting discussed and what it means for the future.

The Ministry of Fisheries and Livestock (MOFL) recently called an important meeting, which brought together Members of Parliament from the coastal constituencies of Bangladesh. The meeting was held in Dhaka on 12 November 1997. It was organized by MOFL, in co-operation with the BOBP of FAO and the UK's Department for International Development.

Mr Ayub Quadri, Secretary, MOFL, chaired the meeting. Mr Humayun Rasheed Chowdhury, Speaker of Bangladesh's Parliament, was the Chief Guest. Mr Satish Chandra Roy, State Minister of Fisheries and Livestock, and Mr Dhirendra Debnath Shambu, Deputy Minister of Shipping, were present as special guests. Senior officials from other departments concerned with coastal development and management, and senior representatives of international aid agencies, also took part.

The objective of this august gathering was to discuss issues and concerns relating to food and livelihood security of coastal Bangladesh. There was a particular emphasis on the need for, benefits of and approaches to more comprehensive and integrated management of coastal natural resources. The MOFL wanted advice on policy directions and on possible mechanisms to facilitate closer coordination and cooperation among agencies concerned to address the food and livelihood security needs of the coastal peoples of Bangladesh.

Why should Bangladesh worry about coastal food and livelihood security?

The need for such a consultation grew out of the work being undertaken by the Department of Fisheries in projects assisted by the BOBP and the DFID (UK) in coastal Bangladesh. **What has emerged from these efforts is a better understanding of the "problematic" confronting the coastal peoples of Bangladesh and its implications to their food and livelihood security.**

Central to the DOF's justification to improve the management of fisheries is the evidence that some fisheries, such as the estuarine set bag net (ESBN) and the push net (PN), are destructive. They catch juveniles of aquatic organisms, which are of commercial interest, thus affecting the fishery resources through both growth and recruitment overfishing. Fisherfolk are concerned about decreasing catch-per-unit-effort rates, falling incomes and a general deterioration in the quality of their lives.

Given the indications that the near-shore fisheries stocks of coastal Bangladesh are under stress and occasionally even show signs of depletion, **the only real biological management option to sustain the fisheries would be to reduce the fishing effort.** This would enable fisheries stocks to recover and enable profitable fisheries for those who are fishing the resource. Reduction of fishing effort would necessarily mean that some fisherfolk have to fish less or not fish at all. This would seriously reduce their earnings — unless they are given other work options, either in fisheries or outside of it. So **the solution to the crisis in fisheries may well lie outside it, in other sectors.**

The ESBN fishery provides livelihood for a large number of people, and estimates vary from about a hundred thousand to 1.5 million. It also provides a sizable fraction of the capture fishery production of Bangladesh. More importantly, the ESBN catch is mostly consumed in the rural hinterlands, providing valuable and affordable animal protein to a large population. The PN fishery provides over 90 per cent of the juvenile *P monodon* requirements of the country's coastal aquaculture industry. **Any drastic management actions on the ESBN and PN fisheries would have serious impacts on the people concerned and on other sectors.**

Coastal fishery resources are not only affected by fishing but also by other factors that affect the eco-system, and the very habitat which provides shelter and sustenance to aquatic organisms. While hard data is difficult to come by, there are enough indications that the quality of the coastal waters is being affected by human habitations that release sewage and dump garbage into coastal waters; industrial effluent and toxic substances finding their way to the sea; pollution from shipping; destruction of mangroves and wetlands; changed water management regimes of rivers that affect the flow of fresh water and increase silt deposition; and so on and so forth. All these affect the ecosystem and its productivity, which in turn affects what the coastal peoples can extract from such resources for their food and livelihood.

Finally, coastal Bangladesh is geographically prone to natural disasters such as floods and cyclones, causing unacceptable levels of damage and loss of human lives. All these factors —

stressed natural resources on land and in the waters, increasing deterioration of the ecosystems through waste disposal and pollution, and proneness to natural disasters — leave the peoples of coastal Bangladesh particularly vulnerable, and their food and livelihood security is at risk. Going by developing country norms, at least 20 to 30 per cent of Bangladesh's population live on a narrow coastal belt, which puts a large population at risk.

What emerges from such a problematic is that **there is justification for the Government of Bangladesh to specially focus on the problems and development options of coastal areas.** There are also indications that given the nature of coastal ecosystems, whose problems are often inter-linked, **there may be a need for more holistic and integrated approaches to address the needs and concerns of the peoples of coastal Bangladesh.** The problem is that no one agency or department or ministry can do the job working alone. One sector's solution may be another's problem, and the actions in one sector may well affect another, often detrimentally. **Government ministries, agencies and departments each have their own objectives, agendas, budgets and ways of functioning. This often makes it difficult for them to address complex, inter-linked and multi-disciplinary problems, such as in coastal areas.**

There is a need for a more proactive, holistic, comprehensive and integrated approach to addressing the needs and

Estuarine set bag net fisherman.

concerns of the coastal peoples of Bangladesh. This will require policies to be developed, coordination and co-operation among agencies and perhaps even changes in the ways that agencies function. The issue at hand is not so much what policy or action will emerge but the very means of achieving a coming together of forces to address the needs of coastal Bangladesh. There is a need to build awareness amongst senior decision makers, administrators and technical staff of the status, trends and the peculiar problematic of the coastal areas and to seek their advice and support to ensure the food and livelihood security of the coastal peoples.

This was the message presented to the parliamentarians. The organizers of the consultation sought to facilitate discussions amongst senior decision makers, administrators and technical staff hoping that the meeting will give opportunities to think through the situation, raise issues, consider policies, and above all consider approaches to working together to address problems and issues that cannot be resolved in isolation.

What did the Consultation achieve?

A large gathering of Members of Parliament, cutting across political party lines, is in and of itself an important step. As representatives of the people, and members of the highest decision making body in the country, Members of Parliament have a major role to play, not only in guiding and evolving policy but also in overseeing the resulting programmes and activities. The discussion was enthusiastic and often hard hitting, as each MP addressed the concerns raised at the meeting in the context of their own constituencies. Problems were identified and elaborated upon. Complaints of inaction and poor performance by concerned agencies were raised. But through it all, the discussion reinforced the fact that the only way to address the needs of the coastal peoples was to encourage various ministries and departments to come together and work in harmony. The Director–General of Fisheries, Mr Md. Liaquat Ali, pointed out that the marine and coastal fisheries sector was emerging after long years of neglect. Trained manpower was inadequate, facilities were lacking and there was no clear policy to guide programming in the sector. However, new directives and actions of MOFL are beginning to address these shortcomings. Mr Simon Bland, First Secretary (Fisheries), British High Commission in Dhaka, reiterated the Director–General's concerns. Given the potential for expansion and development of the marine fishing sector, he assured the meeting that the DFID would co-operate closely in the further development of programmes in marine fisheries.

The FAO Representative in Bangladesh, Mr H Konuma, pointed out that none of the problems mentioned were new. What was new was our understanding that these problems are interlinked and affect each other. The solutions to fisheries may well be on the land and *vice-versa*. Such problems, he said, are difficult to solve — not because technical expertise is lacking, but because it needs people and governments to look at them differently, look at them as a whole rather than in bits and pieces. The real challenge, he added, is to forge new relationships, develop integrated policies and evolve mechanisms to enable different government agencies and people to really work together as stakeholders. **The Members of Parliament, agreeing with this new perception, proposed that a dialogue is necessary among people and the various government bodies and stakeholders to address local and national problems. Most importantly, they offered to facilitate the process by taking the lead and bringing such groups together.**

Where do we go from here?

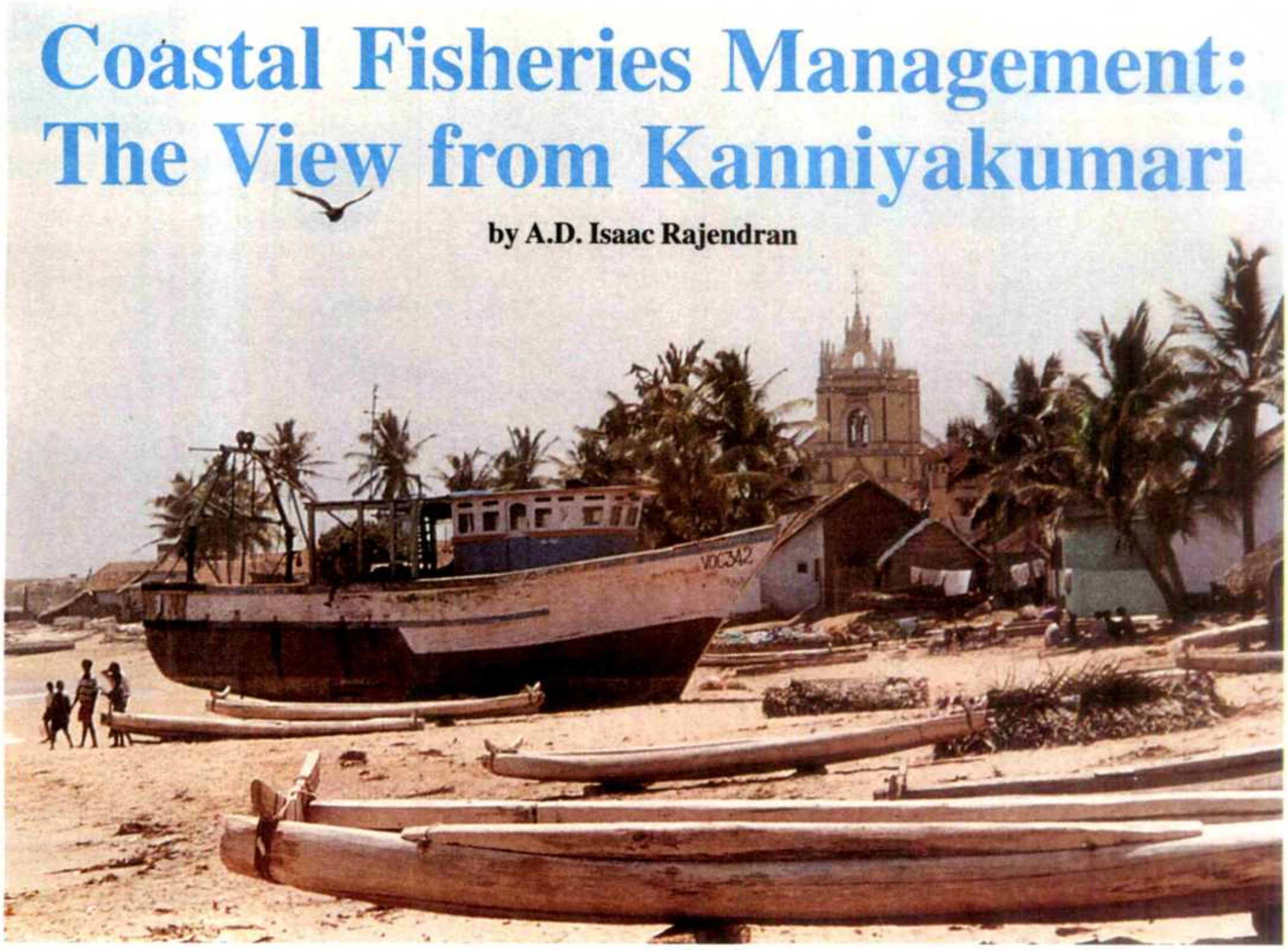
The State Minister of Fisheries and Livestock, Mr Satish Chandra Roy, proposed the first steps by which the people of coastal Bangladesh, the government agencies and the leadership, could come together and address the food and livelihood security concerns of the coastal areas. He said that the Ministry of Fisheries and Livestock was in the process of finalizing a national fisheries policy that would give holistic direction to the sector. He also proposed the formation of a high-level, inter-ministerial task force, with the Prime Minister chairing it, to evolve policy and oversee action.

A first and important step has been taken, senior political leaders and government agencies have gathered, across political party lines, to address an important national issue: food and livelihood security of coastal peoples of Bangladesh. Awareness has been developed about the peculiar inter-connected nature of the problems. A beginning consensus has been arrived at to work together, with all stakeholders and to evolve mechanisms that will enable the various parties to work together. Members of Parliament have offered to facilitate the progress by helping build a dialogue that will lead to development. Perhaps, expecting more from such an august body in so short a time would be asking for too much and would be unfair. The door has been opened for a new era in the development of coastal areas of Bangladesh. Future success would depend on how many pick up the challenge and the commitment to walk through to a better tomorrow.

The push net is another fishery in Bangladesh which provides jobs to hundreds of fisherfolk but is resource-damaging.

Coastal Fisheries Management: The View from Kanniyakumari

by A.D. Isaac Rajendran



Better coastal fisheries management is possible only with the full co-operation of fishermen, who have an important stake in the fisheries resource. What are the perceptions of fishermen in Kanniyakumari district, Tamil Nadu about resource use? What are their problems and their views of solutions? The Tamil Nadu Department of Fisheries, with BOBP support, raised these questions and obtained some answers.

The Tamil Nadu Department of Fisheries has given high priority to coastal fisheries management. It is implementing a pilot activity in CFM (Coastal Fisheries Management) with support from the BOBP. Chennai and Kanniyakumari districts have been chosen for the pilot activity. In Chennai, the focus is on management of trawl fisheries; in Kanniyakumari district, on coastal fisheries.

Fisheries has many stakeholders: fishermen, fish vendors, fish traders big and small, middlemen and moneylenders, processing plants, exporters. In fact, there could be as many as 20 types of stakeholders in any fisheries management scenario. For fisheries management to succeed, all these stakeholders should co-operate and participate. Both top-down and bottom-up participatory approaches are called for. The resource users should become resource managers in collaboration and co-operation with the government and other non-user stakeholders.

As a first step in the pilot activity, the BOBP initiated a series of workshops to train officers of the Department of Fisheries (DOF) in identifying the stakeholders, finding out their perceptions, identifying and analysing their problems, and building a consensus among them about action to be taken.

The trained officers then carried out field work among various stakeholders to obtain and assess their perceptions and identify problems they faced. The field studies provided a vast amount of information. This was analysed and studied by the DOF officers in a follow-up workshop. This workshop indicated the need for detailed consultation by DOF with the different stakeholders in various geographic areas of the district.

It was hoped that these consultations would help reduce or remove differences among various stakeholders, produce understanding and agreement and lead to solution options. Such negotiated settlement would provide legitimacy and co-operative commitment by all stakeholders for the success of agreed management options. Issues that remained unsolved could be taken up later, as and when confidence and goodwill built up among the stakeholders to develop a consensus on those issues.

The Kanniyakumari district has 44 fishing villages spread over 68 km of coast line — three villages on the east coast and the rest in the west coast. There are some 120,000 fishermen in the district, of whom about 25,000 (21%) are engaged in active fishing. 42% of the fisherfolk are literate, all of them are Roman Catholics. The fisherfolk belong to one of two castes – Mukkuva and Bharathar.

The Roman Catholic church, the Kottar Diocese in particular, plays an important role in the life of the people. Traditionally the fisherfolk are well organised and united. However, the introduction of mechanised boats operating trawl nets that target high-value shrimps and other exportable varieties, has resulted in big profits for small groups of mechanised boat fishermen. Result: social imbalances. During the last five years, this had led to intra and inter- village quarrels during the fishing season, endangering law and order.

The Kottar Diocese of the Roman Catholic Church arrested further social unrest by constituting in May 1996 the Kanniyakumari District Coastal Peace and Development Committee (KDCPDC). The aim was to maintain peace and unity among fishermen and work towards development of the coastal villages. A capable and experienced priest heads the committee as Director.

This apex committee works through zonal and village units of KDCPDC on all matters relating to the professional, social and religious needs and problems of the fisherfolk. The coastal villages are grouped into six zones, each comprising six to eight villages. Every village and zone has its own village and zonal committee to attend to needs and problems within their jurisdiction and settle them amicably.

Matters that cannot be settled at the village level are taken up at the zonal level, and thereafter to the apex district body, for settlement. It is heartening to note that most issues including fishing resources management are handled and decided at village/zonal level.

The consultations with various stakeholders relating to coastal fisheries in Kanniyakumari district were held at each of the six zones. Five more consultations were held with other stakeholders. The various stakeholders identified were fisherfolk from the six zones representing the interests of villagers in the zone (including traders, boatbuilders, boat and engine maintenance groups, financiers etc), office bearers of *vallam* and *kattumaram* unions, a mechanised boat operators welfare union, fishermen's co-operative societies, town panchayats and state government officials.

At each and every consultation, in-depth discussions about the perceptions of stakeholders were held about the existing fisheries situation, and the needs, problems and possible solution options relating to the following three aspects:

1) Ensuring sustainable fisheries
2) Administration and management of the fisheries
3) Development and welfare of the fisherfolk

The results of the consultations on these three aspects are outlined below. The facilitators (KDCPDC, DOF and BOBP) did not interfere with the discussions; they knew that fisherfolk dislike interruptions when they are expressing their views, whether or not these views are relevant to the discussion. If they are asked to adhere to the discussion format, the fisherfolk clam up and become silent. Hence, many ideas/needs not directly relevant to fishery resources management were also expressed and recorded.

The views and suggestions expressed at the consultations have been analysed and grouped for follow-up action under the above three heads. The agencies most suitable for follow-up action on these suggestions — such as government departments, NGOs and others — are being identified. Ways and means to implement these suggestions will be discussed at a future workshop. The results that emerge will be placed before fisherfolk and other stakeholders for action and implementation on fisheries resource management.

ENSURING SUSTAINABLE FISHERIES

Fishing methods

- Bottom trawling is the main cause of fishery depletion (the view expressed by the majority of *kattumaram* fishermen). The government should issue notifications on bottom trawling – when and where it should be permitted. (*Vallam* and *kattumaram* fishermen suggested that bottom trawling should be done only between 6 a.m. and 6 p.m. and in the area beyond 25 fathoms in the west coast and 18 fathoms in the east coast.)
- The government should issue notifications to regulate mesh size of cod end of trawlnet and ensure survival of juvenile fishes. (*Kattumaram* fishermen suggested 40mm stretched mesh size at cod end for bottom trawling; and mechanised fishermen suggested 35mm stretched mesh).
- Trawling operations should be restricted to six months in a year (suggested by *kattumaram* fishermen).
- Deep sea fishing operations by foreign vessels within the EEZ area should be banned.
- Fishing with lights to be banned (a few *vallam* fishermen do not agree).

Information

- The government should conduct detailed studies about the spawning and life cycles of commercially important fishes so as to avoid fishing operations during spawning seasons. Fishermen should be told about the breeding season of fish and the area of breeding, so that they avoid fishing at this place during this time.

Conservation of marine resources

- Artificial reefs should be installed to improve fishery resources in selected areas off fishing villages.
- Dredging of river mouths should be taken up to increase exchange of water to enhance materials and plankton production.
- Hatcheries should be constructed to breed mature fishes for sea ranching. Each zone may be provided with such hatcheries. Hatcheries should also be set up in suitable coastal villages, to replenish the export variety of fish seeds in the sea.
- Catching of juvenile cuttle fish and prawns should be avoided. Lobsters below 100 gm in size should not be fished. Regulations may be introduced by the government to prevent export of lobsters below 100gm.
- Fishermen may be advised to release gravid females and juvenile fishes at the catching point.

Pollution control

- Pollution of sea water by factories at Manavalakurichi and Tuticorin should be checked and controlled.
- Testing of bombs and use of explosives in the sea should be banned to save fish resources.

ADMINISTRATION AND MANAGEMENT OF FISHERIES

Enforcement

- The pattern of fishing in Kanniyakumari district varies from zone to zone. It has been suggested in Zone IV that agreements (relating to reason and area of operation) entered into by country crafts and mechanised crafts should be given legal status through government order.
- Department of Fisheries should initiate action to ban fishing with lights from October through March.
- Fishing by foreign vessels should be prohibited as per the 'Dunkel Agreement'.
- Most coastal *kattumaram* and *vallam* fishermen suggest a ban on bottom trawling during June, July and August.
- Motorised crafts should be operated beyond 14 fathoms so as to avoid conflict with country crafts.
- Patrol boats are to be provided to effect strict watch on crafts and prevent fishing in violation of rules.

Dispute settlement

- Problems that arise between villages over individual fishing rights will be taken to the zonal committee. If not solved, the dispute can be taken to KDCPDC. and then to the government. The decision of the government is to be final.

Facilities

- Facilities should be provided to tow country crafts to the Wadge Bank area and tow them back after fishing. The catches should be bought by the government at sea.
- Electronic appliances like walkie-talkie should be provided to mechanised crafts and *vallam* to ensure easy contact by fishermen with the shore.
- As the east coast is heavily surf beaten, sea groin (hook-shaped jetties) should be constructed to enable proper berthing of crafts in selected villages.
- Speed boats and helicopters should be provided by the government for rescue operations during monsoon.

Training

- Diversification of fishing methods should be encouraged. Fishermen should be trained in off-shore pelagic long lining and gill netting.

DEVELOPMENT AND WELFARE SCHEMES

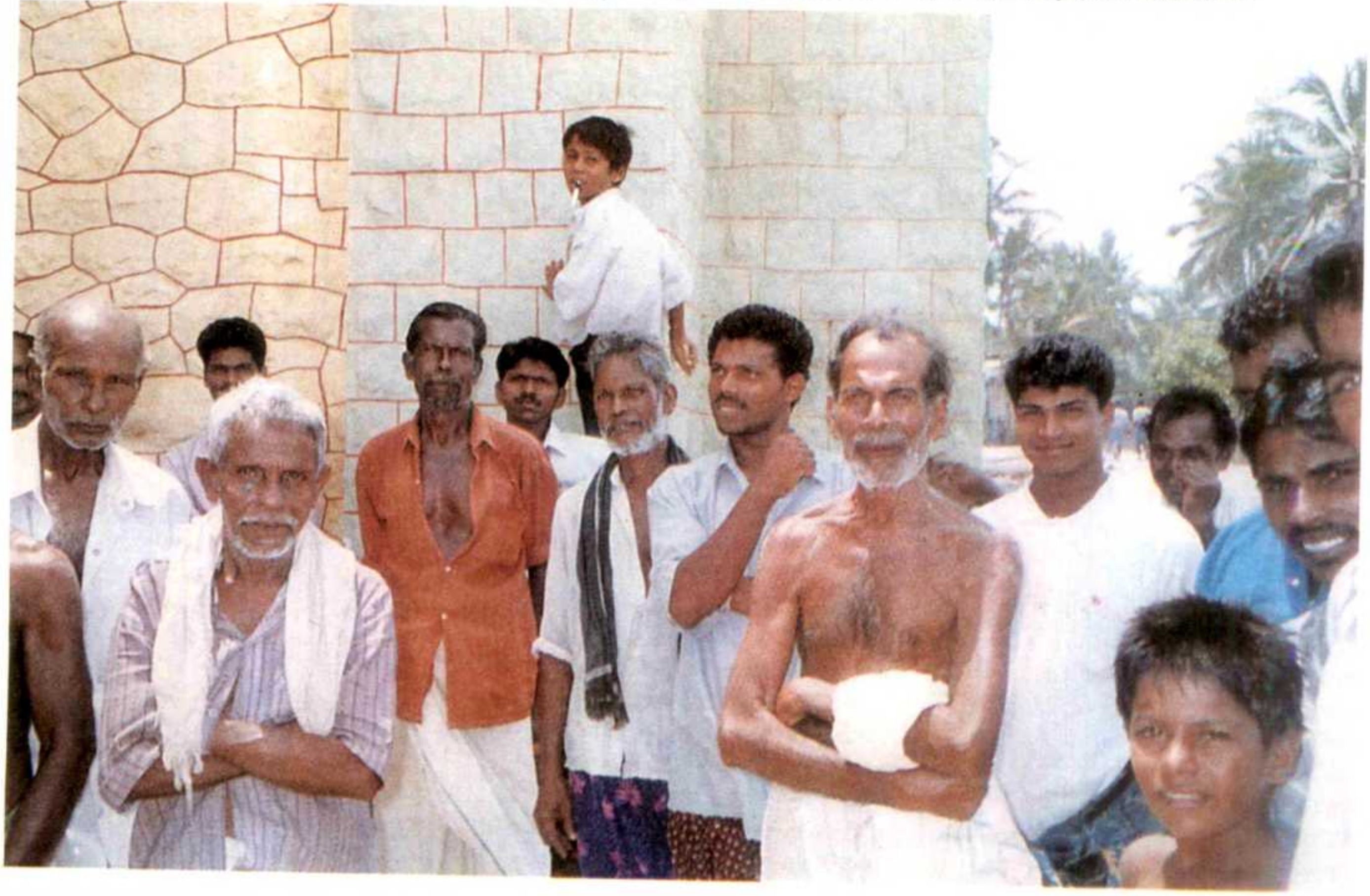
Information and communication

- Information centres should be set up in coastal villages to improve awareness among fishermen of new and improved technologies and happenings elsewhere.
- Special fisheries programmes should be prepared in TV and video—like *'Vayalum Vazhvum'* for farmers.

Finance and subsidy

- Just as farmers get free power supply for farms, fishermen should be provided with free fishing gear.

Fishermen like these, in Kanniyakumari, now take vigorous part in discussions to manage the fisheries resource.



Some of the demands of Kanniyakumari fisherfolk relate to infrastructure and training.

- Kerosene for motorised country crafts and *vallams* should be supplied through fishermen co-operative societies on subsidy.
- Fishermen should be exempted from excise duty on outboard motors (OBMs)
- Policy of one-time government subsidies to fishermen for OBM should be amended. They should be allowed to buy an OBM on subsidy five years after the first OBM.
- Special banks should be set up to provide credit on liberal terms for fishermen.
- The Government of India should resume its one-third contribution to the Marine Savings-cum-Relief Fund, which it stopped some time ago.

Welfare schemes

- The government should acquire coastal *poramboke* lands to strengthen free housing schemes for fisherfolk.
- Coastal roads and proper transport facilities should be provided to villages to promote economic development and to facilitate marketing of fish and allied products.
- Guide lights on the shore are required for villages in Zone VI.
- Ice plants and freezing plants should be put up in every zone.
- Shore-based insulated ice boxes of 200 kg capacity should be supplied to *vallam* and *kattumaram* fishermen — either free or on subsidy.

Education and training

- Training in alternative income generating activities should be given to fisherfolk (assembling electronic spares, tailoring, etc.)
- Technical training centres on the lines of ITI (Industrial Training Institute) should be set up exclusively for fishermen.
- A fisheries college should be started in Kanniyakumari district.

External employment opportunities

- The recommendations of the Venugopal Commission (priority to the sons of the soil) should be implemented, particularly in the police and fisheries departments.

Law and order

- *Vallam* and mechanised crafts that fish in other states are constrained by the sons of the soil policy in those states. Protection should be given to these fishermen.
- Crime in coastal villages should be dealt with severely. Possession of explosives and bombs should be prohibited. There should be at least one police station for every three coastal villages. Patrolling by the police after 5 p.m. is essential.

It is heartening that fishermen of Kanniyakumari have articulated their needs and demands so clearly and congently. It augurs well for the future of fisheries management, and for the welfare of fisherfolk communities.

When fishermen ban fishing gears: A case-study from the Coromandel Coast, Tamil Nadu

by Maarten Bavinck*

Along the Coromandel Coast of Tamil Nadu, fishermen have themselves banned two gear varieties which they consider particularly damaging to the marine ecosystem. Discussing these non-government regulations, the author argues that the "local knowledge" they represent should not be discounted. He says the management capacities of fishing communities along the coastline should be better utilized than they are at present. Legal recognition would constitute the first step in this direction.

One of the important discoveries of fisheries science during the past two decades is the existence of sea tenure systems outside the purview of government. In many places all over the world, fishing communities use their own rules to regulate access to fishing grounds. Sometimes these rules merely structure the interaction between fishing units. But in many cases there are objectives – and effects – of resource maintenance as well.

Some of the important questions that keep researchers in this field busy are : under what circumstances do fishing communities develop and enforce local rule systems? Are the goals of local sea tenure systems similar to those of modern fisheries managers? And to what extent can management systems be linked, to the benefit of all parties concerned?

This article focuses on the regulatory instruments utilized by artisanal fishermen along the Coromandel Coast of Tamil Nadu, India. It gains relevance from the fact that, outside Japan, there is very little evidence of effective sea tenure from large coastal fisheries in Asia. One of the assumptions of researchers is that sea tenure is less likely to exist wherever fishermen are well integrated into a market system (cf.McGoodwin 1990: 108).

My study brings out the weakness of this supposition. If the situation of the Coromandel Coast is at all representative, tenure systems may resist a variety of adverse circumstances besides market integration, including severe competition from trawler fisheries and governments which ignore and sometimes thwart their functioning. My material also draws into question the belief that the Japanese inshore fisheries co-management set-up is so unique that it cannot be replicated in other country settings.

The regulatory instruments I call attention to are of a special kind. Many researchers have pointed out that fishing communities exercise proprietary rights over defined sea territories and control fishing effort by regulating access to space (cf.McGoodwin 1990: 123; Schlager and Ostrom 1993). The fishing communities of the Coromandel Coast go one step further: they also restrict the application of certain types of gear. Such gear bans are of particular interest as they reveal a logic of environmental concern which is not far divorced from the pursuit of governmental fisheries managers.

Following a brief sketch of the character of local fisheries, I describe two instances of gear bans enforced over a large coastal region. I then look into the mechanics of indigenous regulation to conclude with comments on the possibility of co-operative management between government and fishermen. Note that trawler fishing is excluded from the discussion due to its fundamentally different character.

Fisheries along the Coromandel Coast

The Coromandel Coast of Tamil Nadu, which stretches over 400 kilometres of surf-beaten sandy coastline from Point Calimere in the south to Pulicat Lake in the north, covers 229 marine fishing hamlets with an average of about 200 households. They are largely inhabited by fishermen of the Pattinavar caste, who have a long-standing tradition of inshore coastal fishing and are extensively related through marriage. Their fishing technology displays remarkable similalrity. The usual craft is the raft *kattumaram*, varying between 3 and 9 metres in length and fitted either with a latin sail or a long-tailed outboard engine. Crews make use of a variety of drift nets and bottom set nets, occasionally also taking recourse to more traditional bag net technology such as beach seines.

Most fishing is concentrated in the 20 fathom zone off their own settlement, with neighbouring communities sharing substantial overlaps in fishing territory. Although there is a sense of 'commonness' to the sea, which makes it unsuited for exercising property rights, fishermen recognize the prerogative of each community to control activities taking place in their specific sea area. The boundaries are formed by extending land borders seaward. As land borders are contiguous, so are sea borders. The consequence is that the inshore waters of the Coromandel Coast can all be considered to be under tenure, subject to the regulation of adjoining settlements. There is no sea area within 20 fathoms depth which is genuinely no-man's space.

What does the control of fishermen over sea territory mean in practice? In the words of one hot–headed young fisherman, it signifies that outsiders must follow directions, and "we will hit them if they don't do as we say". Many of the 'directions' he is referring to are decided upon by non-governmental councils

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which administer common affairs in fishing villages. These councils also enforce decisions, applying a range of sanctions which, contrary to the suggestion of my respondent, are decidedly more elaborate than a show of fists. A restriction on the type of fishing technology that can be used forms one of the more usual rulings.

There is evidence that the fishing communities of the Coromandel Coast have selectively pronounced bans on gear for at least a century.[1] Needless to say, however, not all new gear is prohibited : a reconstruction of technical change demonstrates that new gear types and applications have often found acceptance along this coastline. Instead, banning is restricted to those gear varieties which are felt to be exceedingly harmful to the communities concerned.

One point must be emphasized: gear bans are decided by individual village councils and may differ from community to community. Interestingly, however, some gear bans are replicated over a very large coastal region. This suggests the existence of a common denominator in the motivations of the village councils concerned – common ideas on what is good or bad for the profession and for the fisher people in question.

The banning of the snail net[2]

At some point in 1995, export traders dealing in special seafood products offered individual fishermen small hoop nets called *kachaavalai* (literally net baited with waste) with which they could catch snails on the sea floor. As the prevailing price for snails was worthwhile, fishermen in a number of hamlets decided to give snail netfishing a try. (In 1995, the landing price for snails was approximately 7 Rs/kg, with special rates for the ventricle lids or opercule)

In the following months, however, village councils along at least 100 kilometres of coastline swung into action, prohibiting the use of the net. In 28 fishing hamlets for which I have evidence, the snail net was disallowed soon after it was introduced by trading interests. In some locations prohibition was subject to discussion and dispute. In others, it was decided quietly and without much ado. Government authorities were involved in only one case, when law and order was at stake. In all instances the council decision received adherence.

Why the ban on the snail net? Fishermen advance two ecological arguments. First, they believe that the smell of the bait (which invariably consists of decomposing meat) has a negative influence on fish stocks in the surrounding area. Second, they argue that the snails targeted by the snail net play an essential role in maintaining fish stocks in inshore waters. If snails were to be removed in large quantities, fishermen felt that fish stocks were likely to decline in inshore areas. Social motives reinforce this line of thought. A fisherman attending a meeting to decide on the matter wondered: "Why should everyone suffer because of the activities of a few?" And another, quoting a common saying, said "Ten people shouldn't make a profit at the expense the community".

The snail net ban is too recent to make judgements on how long it will remain in force. The banning of the ray fish net demonstrates, however, that gear prohibitions can be effective over a long period of time.

The banning of the ray fish net

Although fishermen along the Coromandel Coast were vaguely familiar with the 12" bottom-set ray fish net *(tirukkaivalai)* at least since the beginning of this century, they prohibited its usage only in the 1970's. The timing of this 'act of resistance'coincided with the Fisheries Department's innovative programme of that period, which offered fishermen the choice of a large range of gear types, including the ray fish net, at subsidized rates. This threatened to give the net a wide distribution, perhaps triggering restrictions.

Like the snail net, the ray fish net was banned over a large geographical region by one village council after another. Like its successor it was also prohibited in spite of an active demand for the target species – ray fish – on the domestic market[3]. This implies that those enforcing the ban were, and are, regularly pressurized to relax control. The fact that they have not done so is because any relaxation can cause much harm.

Today the ban is enforced by a majority of village councils within a radius of at least 50 kilometers from Madras, although the net can be readily procured from gear manufacturers and net shops. My data demonstrates that even where the net is used, it does not necessarily imply a lack of popular support for prohibition. In many cases non-enforcement is clearly related to a crisis in village administration and a consequent lack of control.

Why ban the ray fish net? Here again the fishermen have their reasons. For one, they say that ray fish act as umbrellas for many smaller fish varieties congregating in their shade. Removing ray fish will therefore cause the dispersal of more important target species from inshore waters. This process is reinforced by the pungent smell exuded by ray fish in what is said to be a protracted death struggle. This apparently transmits warning signals to other forms of marine life in the vicinity. As in the case of the snail net ban, ecological motives combine with social ones. Why should we let a few fishermen profit from ray net fishing if the rest would suffer from its effects?

Reflections on gear bans

In both examples presented above, village councils prohibited fishing gear on the basis of local knowledge with regard to the functioning of the marine ecosystem. It must be emphasized that the veracity of this knowledge has not been studied or validated through scientific enquiry; but the value of 'local knowledge' should not be written off too quickly.

But even if fishing communities along the Coromandel Coast would prove to be wrong in their ecological reasoning, it must be noted that they are concerned about (a) possible social conflicts between the different groups of fishermen – those who want the gears banned and those who continue using it; b) the sustainability of fishing operations. It must also be noted that the communities have developed organizational structures and mechanisms to handle perceived threats to the common good. These may well have their uses in another management framework.

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[1] For a review of the history of restrictions on fishing gear, see Bavinch M., 1997.

[2] This instance of gear banning is discussed in greater detail in Bavinck M, 1996.

[3] The ray fish belongs to cheaper varieties of seafood on the domestic market. It is appreciated mainly for its nourishment. (c.f. Marketing and Research Group Pvt. Ltd. 1992: 64-65)

Organizational structures of regulation

Small group size and social homogeneity, it is said, often contribute to effective self-management of common pool resources. This is brought out by the communities of the Coromandel Coast, which are renowned for their cohesion and their predilection for self-governance. A council with a *chettiyar* or president as its head has traditionally managed common village affairs, including those which pertain to fisheries. Important matters, however, are invariably discussed and decided on at public meetings, to which all village members are invited. It must be pointed out that membership conveys privileges and duties and is a highly formal affair. Generally speaking the roll includes all local fishermen (with the emphasis both on 'fisher' and on 'men'). Village members pay taxes, take part in meetings and are also the main enforcers of decisions taken. The most common current sanction against violations of village rules is the imposition of a fine, payable to the village fund or the temple.

This institutional set-up is of course neither permanent nor perfect. What impressed me most, however, is its flexibility. Institutional history demonstrates that the form of village administration has changed repeatedly in the past decades in response to new demands – such as the wish for more democracy – without losing much of its effectiveness. Its continuing strength and adaptability would appear to be useful in any attempt to forge a co-operative resource management framework between government and fishermen.

Possibilities for co-management

The Japanese inshore fisheries resource management set-up is often cited as an example of successful collaboration between government and fishermen (cf. Ruddle 1987). Perhaps because it is presumed to be unique, little effort has gone into replicating this set-up in other countries of Asia. I argue that, with the exception of one, the same conditions exist along the Coromandel Coast.

In Japan, the government has delegated formal authority over inshore fishing territories to local fishermen organizations. These have decision-making authority on access and withdrawal in the territories over which they have jurisdiction. It is often emphasized that this arrangement forms the continuation of an old feudal set-up; this would in fact explain much of its success. Along the Coromandel Coast I have pointed out a tenurial system, run by fishermen, for inshore waters. Each fishing settlement exercises control over a defined sea space; authority is vested with a village council which takes measures to regulate fishing in accordance with common interest. Concern with long-term resource sustainability is demonstrated through the selective prohibition of gear types and applications. Just as in Japan, this arrangement dates back over a long period of time; for fishermen it has a large measure of matter-of-fact-ness.

The important difference between the two country settings therefore does not seem to lie with the fishermen. Rather I believe it is in government policy with regard to fisheries regulation that the distinction gains force. By transferring formal authority over sea space to local fisher organizations, the Japanese Government has followed a course fundamentally different from the Tamil Nadu and Central Governments. Here formal authority over inshore waters remains vested with the state, which recognizes fishermen institutions only informally.

Schlager and Ostrom (1993:32) have pointed out that communities which hold more complete sets of property rights are more likely to achieve success in resolving common pool resource dilemmas. This ties in with observations made by proponents of fisheries co-management, for whom legal recognition is a crucial variable. Jentoft (1989:144) thus pleads for granting fishermen's organizations "authority by law to enforce regulations on member fishermen".

In Tamil Nadu therefore it now appears to be the government's turn to act. Recognition of the legal right of fishermen councils to regulate inshore fisheries, however this right would be circumscribed, might be a first step towards a potentially fruitful new management approach. And what could be won by taking such a step? I believe co-management forms a possible solution to several of the problems looming over inshore fisheries along the Coromandel Coast: the rapid depletion of fish stocks, competition between artisanal and trawler fisheries, and the danger of thousands of fishermen families losing employment and income.

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Do Commercial Users Influence Marine Fisheries Management?

by Susan Shipman

Commercial fishers should be encouraged to provide their inputs into decision-making on fisheries management. Here are some interesting examples from the United States, provided by the author, a marine fisheries official from Georgia state.

Commercial fishers do have political influence in the fishery management process. What is the barometer of this influence? Escalating declines in fisheries resources due to politically forced inaction or mismanagement? Increasing occurrences of managers exiting regulatory forums with a sense of satisfaction that both the resource and the fishers are emerging winners? I prefer to use the latter gauge.

Increasingly, I encounter situations in which commercial fishers are influencing, if not crafting, fisheries the management strategies to yield positive results. One example at the state level is the recent regulation of Georgia's blue crab fishery. This fishery was arguably the most unregulated of our state's commercial fisheries until 1995, when industry members allied with fishery managers to implement not only a gear regulation but also a licence moratorium in only a few short months. Fearing an influx of commercial fishers displaced by gear bans and/or declining fisheries in neighboring states or other regions, industry leaders approached the Georgia Department of Natural Resources (DNR) in the fall of 1994, seeking controlled access for this fishery. For six months, the crabbers held industry meetings, lobbied elected officials, recruited legislative sponsors, and–with technical support by the DNR–successfully made their case for a licence moratorium to the 1995 Georgia General Assembly. Just weeks prior, these same industry leaders were co-hosting public hearings with regulators, promoting another industry initiative—a requirement for escape rings in crab traps—that was subsequently adopted into regulation by the state's Board of Natural Resources in February 1995.

The influence of commercial fishers at the federal level has no doubt been fostered by provisions of the Magnuson Fishery Conservation and Management Act (Magnuson Act), which assure representation of commercial fishing interests in the voting membership of the regional fishery management councils. The act also provides for further input into the process via industry advisory panels. I believe the council deliberations benefit from these members' first-hand knowledge of the fisheries being managed.

Examples of commercial fishers influencing the federal management process abound in the South Atlantic region. Consider the case of two South Florida fishers, former fish trappers who were closed out of that fishery by a gear ban adopted by the South Atlantic Fishery Management Council and implemented by the National Marine Fisheries Service in 1992. These individuals had worked within the council system for several years as snapper-grouper advisors before their method of fishing was prohibited on a close 7-6 vote. Embittered, they engaged in a lengthy, costly, and eventually unsuccessful court battle against the council and the U.S. Secretary of Commerce. With great trepidation, these same individuals nonetheless returned to the council system in October 1994, requesting management of a relatively new crustacean fishery they had helped pioneer in 1992. The council responded favorably, collaborating with them and other industry members to develop a controlled-access management regime for the new golden crab fishery in six short months.

My belief that commercial fishers do influence the federal process was further reinforced during management deliberations involving the South Atlantic rock shrimp fishery, which is conducted almost exclusively off the east coast of Florida. After two years of public hearings, including input from South Atlantic industry advisers, the South Atlantic Council was poised to take final action to prohibit fishing in a large geographic area because of potential coral habitat damage. Virtually silent for the preceding two years, a large contingent of the industry came forward at the final public hearing, not surprisingly objecting to the proposed trawl prohibition. The group largely comprised harvesters and processors from outside the South Atlantic region. The rock shrimpers pledged to form an industry advisory group broadly representative of all industry participants if given the chance to craft a compromise on the proposed closure area. The South Atlantic Council delayed action. The industry did indeed organize, and harvesters, packers, and processors sacrificed considerable work time to attend meetings. Gaps were bridged between rival East Coast and Gulf of Mexico competitors, and the industry delivered on its promise. The council and the industry reached a compromise, and the council adopted the rock shrimp amendment to the Fishery Management Plan for the Shrimp Fishery of the South Atlantic Region in June 1995. Although a portion of the industry's former shrimping grounds was placed off-limits, the final outcome was undeniably less severe than what it could have been, and was about to be, only four months earlier.

The commercial fishing industry's growing industry influence is largely attributed to emerging industry leaders characterized by their commitment to the

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resource as well as to their profession, and recognized by their credibility and perseverance to work within existing management systems to evoke positive change. The industry leadership has detected the rising groundswell of other interest groups that often boast greater memberships and financial resources. Recognizing the distant light as the oncoming train, fishers are re-routing that train via proactive co-operation in the areas of bycatch reduction, elimination of marine debris, and habitat protection. New alliances are being formed, as evidenced by the Georgia shrimpers during the summer of 1995.

Twice during the same year, Georgia trawlers were subjected to more restrictive Turtle Excluded Device (TED) regulations pursuant to an emergency response plan to curb elevated sea turtle mortalities. The first round of restrictive regulations allowed only top-shooting, hard TEDs. Industry leaders vociferously but civilly protested, making their case to federal regulators and their congressional delegations to relax the regulations and allow bottom-shooting, hard TEDs. The shrimpers even garnered the support of Earth Island Institute, one of the staunchest national animal rights organizations and an otherwise unlikely ally. Georgia shrimpers had previously allied with Earth Island Institute in litigation to block imports from shrimp-producing nations lacking TED requirements. When elevated turtle strandings again plagued the Georgia fishery a year ago, federal regulators implemented a second round of emergency measures, this time allowing the use of bottom-shooting TEDs.

The days of shaking fists, flying expletives and physical threats are, thankfully, more the exception than the norm. Commercial fishing industry leaders recognized by their peers for their influence with regulators are more often than not even-tempered, articulate, open-minded, and respectful not only of decision makers but also of those users who hold different opinions. In my fishery management council experience, fishers come to the table better prepared with data and graphics than they did in the past. In turn, they are queried, and their input is given weight by managers during deliberations.

During recent South Atlantic Council deliberations to craft the Golden Crab FMP, a particular sticking point was who would be in or left out of the controlled access system. After weeks of data review, debate, and testimony from fishery participants, commercial fishers sitting on the Council broke the deadlock and proposed tiered eligibility criteria that would accomplish the desired level of participation and pioneering in the fishery while assuring the risk-averse underpinning of the new FMP.

As governments at all levels and jurisdictions strategically reinvent and embrace high-quality management, focus groups incorporating citizen and user advisory panels are increasingly the trend. Commercial fishers must seize these opportunities to participate in the fishery management process. Excellent publications exist to guide commercial fishers in the how-to's of involvement. *Fisheries Management for Fishermen: A Manual for Helping Fishermen Understand the Federal Management Process* (Wallace et al. 1994); *and Fish or Cut Bait: An Introductory Guide to the Federal Management System for Atlantic Coast Fishermen and Women (McCay and Creed 1995)* are two such guidebooks. Although oriented toward the federal process, the principles and procedures detailed in these easy-to-read manuals are useful at the state and local levels as well.

Providing commercial fishers with information early and incorporating them into decision–making helps circumvent the controversy and conflict that erupt when decisions are made without the industry's input. Although the end result may not be their preferred option, including commercial fishers in the dialogue enhances their "buy-in" of the resulting regulations. With most fish stocks fully exploited, if not overexploited, and an ever–increasing number of users wanting a slice of the pie, continued and increased regulation is inevitable. Even congressional leaders such as veteran Sen. Ted Stevens (R-AK) acknowledged this to South Atlantic fishers and managers attending a 1995 Magnuson Act reauthorization field hearing (U.S. Congress 1995). Increasingly affected by this regulatory trend, commercial fishers are becoming more knowledgeable about the process and, in turn, are learning how to effectively influence it. The process itself and ultimately the resource stand to gain from this involvement.

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Smart Partnerships–the Message from Penang

By Karin Borzel[1] and Kee-Chai CHONG

Sustaining the fisheries resource and alleviating poverty among fisherfolk – these are ambitious goals. Achieving them is possible only through 'smart partnerships' among different types of stakeholders – such as the government, the fisherfolk community, the scientists, the private sector. This was the theme of a workshop in Penang, Malaysia, reported in brief on these pages.

'The Pearl of the Orient' — beautiful Penang, Malaysia — was the venue for a three-day seminar on 'Smart Partnerships For Sustainability in the Fishing Industry' which was held from 26 to 28 November, 1997. It was organized jointly by the BOBP and the Institute on Governance (IOG, Canada), with support from the Department of Fisheries, Malaysia (DOFM), and the Maritime Institute of Malaysia (MIMA).

The seminar's objectives were:

(a) to provide an understanding of the global forces that shape changes in the regulatory processes in the fishing industry;

(b) to share information about innovative approaches to self-regulations which have been implemented in different countries;

(c) to provide an understanding of the factors behind the successes and failures of self-regulation in different social, economic and political settings; and

(d) to explore how the participants might enhance the effectiveness of their own national regulatory processes through enhanced private-public sector partnerships.

The 50 workshop participants came from both developed and developing countries. There were plenary presentations from Dr Masamichi Hotta (Japan), Mr. Richard Cashin (Canada), Mr. Patrick Appleton and Mr.Peter Finglas (Australia), Ms. Sevaly Sen (Denmark) and Dr Kee-Chai CHONG (BOBP). Country experiences were reported from Malaysia, Philippines, Thailand, Indonesia, Maldives, Sri Lanka, Bangladesh and India.

Each presentation was followed by discussion. Together, they provided insights into the successes and failures of fisheries management, and yielded suggestions for more successful practices. Community-Based Management (CBM), highlighted throughout the seminar, was seen as a key factor behind the sustainability of fishing industries, whether national or global (please see other articles in this issue).

Judging from the discussions and the proposed follow-up activities, the seminar was a great success. Information and experiences were shared. Participants returned home convinced that the battle to create a sustainable industry does have its warriors. In the words of Mr. Richard Cashin of Canada, 'There is no single solution. There is no single lesson'. The process of sharing and learning, through seminars such as this,

Small-scale fisherfolk of Phang Nga Bay who have volunteered to serve as sea wardens or rangers to help enforce resource regulations, are being distributed uniforms by the local chamber of commerce and Trawler Fishermen Association. An example of "smart partnership".

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enables a search for solutions that everyone can adapt everywhere to further the cause of sustainability. Participants agreed that opportunities for meaningful partnerships among the diverse groups of stakeholders are endless.

Glimpses into Workshop Papers

Here are glimpses into a few papers presented at the workshop.

Ms Sevaly Sen, from the Institute of Fisheries Management, North Sea Centre, Denmark spoke of the 'moral distance' of government from its people as partly responsible for the continuing ineffectiveness of government's top-down approach to fisheries management. Because of this 'moral distance,' the fishing community does not fully appreciate management efforts introduced (or rather imposed) by the government. Likewise, government does not fully understand the local conditions of the fishing community it wishes to regulate. Ms Sen said the concept of fisheries 'co-management' encompasses a wide range of partnerships between the government and stakeholder resource users, especially in the process of consensus solutions.

Dr Kee-Chai Chong spoke on 'Sustainability of Fisheries: Global Challenges for the Future'. He focused on three factors that have caused environmental degradation and resource depletion: overpopulation, consumption excesses, and abusive use of technology.

He said the needs of an increasing population can be met if the idea of sustainable development and management of fisheries is promoted. "Without management, there is no way supply can meet demand."

Decrying consumption excesses, Dr.Chong said that human irresponsibility has exacted a heavy toll from fisheries. He said "Mother Nature has been bearing a large part of the costs... It will no longer subsidise irresponsible consumption and production". Management was needed to moderate 'undesirable human impact' and regulate it.

Technology can be used positively, but the current power- hungry attitude makes it a tool of destruction. Fisheries planners do not help either because they keep projecting higher and higher per capita fish consumption in their 5-year national development plans. These automatically translate into pressures on the production unit to find ways to increase production. Today, the per capita consumption of fish in Japan is already 65kg/capita/year. In Hong Kong, Taiwan, Singapore and Malaysia, it ranges from 40 to 55 kg/capita/year, while in Indonesia and Thailand, it is only about 20-25 kg/capita/year. For India, Bangladesh, Sri Lanka it is still way below 10 kg/capita/year. With ever increasing projections made by fisheries planners, is it any wonder that our fisheries are continuously under severe and heavy fishing pressure? World trade in fish has surged to over US$ 50 billion a year.

Dr. Chong said that management 'revolves around the effort to help the natural resource ecosystem and the environment to cope with increased uses'. This type of management can best be done through 'smart partnerships' or, the forging of partnerships between different stakeholders in the entire marketing chain (government, fisherfolk, market intermediaries, chefs/cooks, consumers, so that the interests of all stakeholders can be considered. The government continues to play an important role in smart partnerships, by maintaining order and resolving political and legal disputes.

> *"Human irresponsibility has exacted a heavy toll from fisheries... Mother Nature will no longer subsidize irresponsible consumption and production."*

Community-Based Management (CBM), Dr Chong said, confers on people limited rights or ownership of their fisheries system and promotes positive changes by altering socio-cultural attitudes and practices that relate to fisheries management. He identified three basic steps for the success of CBMs. First, a consensus must be arrived at through public hearings on what is at stake for all concerned. Once this consensus is established, the style and type of management to be implemented must suit the needs of the communities. Finally, education. Educating the public through practices such as ecolabelling and realistic cost evaluation will create informed consumers and producers who will take personal responsibility for fisheries management.

Dr. Chong said that government-centralised management intervention in fisheries is on its way out as it is cost-inefficient and relatively ineffective. Further, governments are downsizing. "Reduced government support for sustainable management of fisheries has created the need for new funding mechanisms" for management. Such mechanisms must be worked out quickly if fisheries is to be managed.

"Giving citizens pride of place and putting them at the centre-stage of manage-ment, with government managers watching from the sidelines, will go a long way toward promoting community management of local fisheries".

In Queensland, Australia, several tiers of government bear the responsibility for fisheries management. Some light on the system was shed by two guest speakers from Queensland: Mr Patrick Appleton of the Queensland Fisheries Management Authority (QFMA), and Mr Peter Finglas, of the Queensland Department of Primary Industry (QDPI).

Mr. Appleton said that QFMA drives appropriate management, use, development, and protection of fisheries resources. It liaises with other state governments, statutory authorities and local governments and promotes co-operation at all levels for strategic planning and effective day-to-day management of fisheries.

He said that Queensland fisheries have met substantive challenges over the past 3-4 years. The management of Queensland's fisheries has moved away from a technocratic model of management, because of dissatisfaction on the part of key stakeholders. Besides, increased population, changes to commercial and recreational fishing and pressure from traditional fisheries are impacting the capacity of the environment to sustain fishing.

As 'custodians' of fisheries resources, the government must adapt to these challenges, Mr Appleton said. 'In order to ensure the continued sustainability of fisheries and their effective management, all levels of government must co-operate'. Such co-operation meant the need for a different approach to fisheries management that involved equity in decision-making and long-term protection of resources. The new model adopted sets out to protect the public

At Pulau Payar Park, Kedah, Malaysia, young men from the fishing community and from tourist business receive training as underwater tour guides.

interest in resources, provide a technical basis for management and involve major stakeholders directly in management planning.

In 1994, the Queensland Fisheries Act was established. It sets out clear directions for fisheries management. It further established a new statutory authority, the QFMA. Prior to 1994, the QFMA's role was unclear. Following the Act, its prime function was to deliver manage-ment based on the principles of ecologically sustainable development.

"Management planning requires a co-operative and integrated approach across agencies and user groups", Mr Appleton said. He further elaborated that "management offers opportunities for integration of information and expertise from across a range of users and disciplines...". He went on to say that, "The aim is to produce a management plan which is user-friendly, is broadly accepted by stakeholders and ensures protection of the state's fisheries resources as well as access to them."

For such management to occur, consultation and community involvement are necessary. Two levels of consultation and involvement were created through the Management Advisory Committees (MACs) and Zonal Advisory Committees (ZACs). MACs, Mr. Appleton explained, 'are building blocks in the process of developing management plans'. They are the principal sources of planning and advice for the authorities. ZACs, on the other hand, provide a forum for regional communities to provide advice on the diverse range of issues impacting on local fisheries. The principal benefit is that ZACs enable the collection and dissemination of information to the general public.

Three basic steps are needed for community-based management to succeed. Establish a consensus. Work out a management style that suits the communities. Finally, educate the public.

Creating MACs and ZACs was difficult but rewarding, because they have changed the culture of fisheries management in Queensland in three significant ways. They have generated the feeling that 'publicly owned resources need to be shared on a fair and equitable basis'. Second, stakeholders, government and the community have come to realise that fisheries resources are limited and that uncontrolled and irresponsible fishing by any group must not be permitted. Finally, that the role of government agencies is facilitation, negotiation and mediation.

Mr. Appleton was not able to comment on the success or failure of such a process as it is still in the developing stages. New arrangements and processes take time but can create an 'ownership attitude'. Further, the Queensland model will only be as successful as the partici-pants allow it to be. The workability of the new arrangements will depend on the support and participation of the users.'

Mr Peter Finglas of Queensland's Department of Primary Industry (QDPI), concurred with much of Mr. Appleton's remarks. He said that QDPI functions as a rural economic development agency that links government and industry in partnership to "increase the profitability of primary industry-based enterprises on a sustainable basis". Overall, QDPI is responsible for management, use, development and protection of aquaculture, marine plants and fish habitats. However, the fisheries resources are available to all, and the 'responsibility for their management and stewardship is a public service shared by government, the resource user and the general community'.

Specifically, the Department of Primary Industries is guided by policies that ensure equitable and consistent decisions which impact fish habitats. A part of this process of policy creation is to include communities in the decision-making process. Mr. Finglas stressed that it is important to 'include inputs from the community early on in the process to ensure that decisions are based on available knowledge and that community members are genuinely part of the process'.

Mr. Finglas stressed the importance of community inputs into decision-making. Partnerships between fisheries agencies such as QDPI and the community reduce conflicts, increase information sharing and create a feeling of ownership within the community. Result: they become a part of the solution to the challenges now facing the fishing industry.

BAY OF BENGAL NEWS

Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional multi-agency fisheries programme which covers seven countries around the Bay of Bengal — Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The Programme plays a catalytic and consultative role : it develops, demonstrates and promotes new methodologies, techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in the member countries. The BOBP is sponsored by the governments of Denmark and Japan, by member governments in the Bay of Bengal region. The main executing agency is the FAO (Food and Agriculture Organization of the United Nations.)

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SHRIMP CULTURE

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Problems and Challenges

Can the enormous potential of shrimp culture for furthering the national and social good be tapped without environmental ill effects? In this issue of Bay of Bengal News, *aquaculturists, economists and social activists examine various facets of the controversy. They agree that wise, responsible and sustainable shrimp culture is possible – and suggest ideas and mechanisms to bring it about.*

A Letter from the Editor

CULTIVATING WATER

More than 20 years since the 1974 World Food Conference pledged to end hunger within 10 years, hunger still stalks the world. More than 800 million people go to bed hungry every night.

The 1996 World Food Summit re-examined the spectre of hunger. It asserted that Food for All is the "inalienable right" of every living person.

We face loss of arable land, declining productivity of land and soil due to land exhaustion, plateauing of agricultural technological productivity. Concrete steps to increase the productivity of our waters to meet demand for food and raw materials are urgent. After all, water resources have supported human life for thousands of years —particularly through fish — and can continue to do so, given proper planning and management. It's time we harvested more from water than we do now.

There was a time in recent history when water bodies and tracts of low-lying land — swamps, marshes, wetlands and bogs — were inundated. They were considered a menace to health because they harboured malarial mosquitoes and other vermin. Stories were told of criminals and convicts using such places to hide from the public eye. Even today, many people still describe marshy and waterlogged areas as wasteland.

Huge investments were made to drain and reclaim these waterlogged areas for houses and farms. Departments of irrigation and drainage were set up by many governments to oversee such public works investments. While these departments did channel water for irrigation, especially in arid and rain-deficient areas, considerably more effort was put into draining waterlogged areas. Was such draining essential? Was it because arable and residential land is growing scarce?

Governments drained and reclaimed, giving little thought to possible consequences for water table stability and the overall water cycle regime. Such projects, combined with indiscriminate deforestation, unwittingly altered the natural water recirculation patterns and the water cycle, which are crucial for husbanding the world's precious and limited freshwater stock. Charles Angell (p12) says that of the 71,000 odd hectares of shrimp ponds in Andhra Pradesh, about 56,000 ha or almost 80% constitute water surface area. These are cultivated to produce food, generate jobs and earn foreign exchange. There is therefore no need to drain such water areas.

While water tables continue to be drawn down from excessive use, we are forced to consider harvesting rain and collecting surface water and run-off to recharge the water tables. Have we come full circle? What tragic irony! Have we learned any lessons? Are we capable of learning?

Land subsidence is spreading as water tables sink, further aggravating the decline in land productivity, not to mention rise in sea levels and further inundation of coastal lands and vital ecosystems. This time around, it is saline water and not fresh water.

A water crisis looms large each day as we carelessly go about our daily business. The supply of water has been taken for granted by many of us who casually turn the tap - and sometimes forget to close it ! But people who travel long distances even to bathe, have come to accept such hardships as inevitable.

The importance of water as a life - support system must never be overlooked. We must use water as a resource that's extremely limited. Water is basic to life — 90% of the human body is nothing but water.

Not only should we be frugal with water, we should increase the per unit productivity of water. Technical and management know-how are available. Soil and plant scientists, including peat soil specialists, have been applying themselves to increase agricultural productivity, but there is no water scientist. Land economics is well known as a sub-discipline of economics, but water economics does not figure in any university curriculum.

Just as soil cultivation in agriculture has been modernised to increase agricultural productivity, water should be cultivated to greatly increase the production of goods and services per unit of water. Land and soil are able to absorb waste and recycle it. Water can do the same with the waste products of economic activity. Coastal wetlands can effectively assimilate human-generated waste and maintain water quality to support life in its myriad forms. These life forms are able to use, digest, assimilate, and convert concentrated wastes into useful materials. Or at least detoxify them.

Water involves three - dimensional volume. The entire water column can be cultivated—unlike land, where only the unidimensional surface area can be cultivated. We can seed water bodies to grow more fish and plants, both for food and for industrial raw materials. Heating and cooling for industries must be made more efficient and cost-effective through appropriate recycling. We can enhance the growth conditions of water through natural and artificial means. The Japanese Seto Inland Sea is a good example of water cultivation through advanced planning and management.

Water is a renewable food production support system. To date, very little is known about the fertility profile and patterns of water. (In contrast, the land and soil profile, and the fertility patterns of land, have been well researched and analysed). By cultivating water, we are cultivating our future. Are we up to it?

Kee-Chai CHONG

WOMEN FEED THE WORLD

The theme for World Food Day (October 16), 1998 was "Women Feed the World". The FAO worldwide and in India held several observances on the occasion. They highlighted the fact that in many countries women work longer hours than men. They take part in food production activities, also shoulder the burden of preparing and processing the food, besides running the home and nurturing children. Yet they suffer from neglect, lack of recognition, and gender-based discrimination. To improve the lot of women, they need better access to food, education, technology, rural organization, credit, services, land, extension and training.

The FAO and BOBP held their own World Food Day observance in Chennai. It focused on a school in Besant Nagar, South Chennai, that teaches 650 students from Class 1 to Class 10 – most of them from fishing communities in Orur-Olcott Kuppam and Odamanagar.

As part of the observance, children, staff and special invitees - the mothers of the children – attended a function at the school on the evening of October 16. Four children spoke on "Women who feed the world". A professional troupe staged a play that dramatized the work and the life of women from fishing communities, and their sacrifices for their families.

The children presented mementoes to the five women who manage the school's Noon Meal Scheme, as a token of their gratitude. A special lunch was prepared for World Food Day.

Says the principal of the school, Mrs. Lakshmi Narasimhan, "The children indeed responded with great enthusiasm to the theme of World Food Day. They loved the idea of expressing their appreciation to their mothers and to 'women who feed the world'."

Fisherfolk children from a school in south Chennai enjoyed a special lunch on the occasion of World Food Day.
Top: The students' mothers – women from the fishing community – were invitees to an evening function at the school.
Above: A play was put up about the lives of fisherwomen.

Shrimp culture in India: Where is it now? Where is it going?

by M Sakthivel

The President of the Aquaculture Foundation of India describes the present status of shrimp culture in India, following the recent Supreme Court judgment. He also examines a number of "myths" concerning shrimp farming, and outlines measures necessary for sustainable shrimp farming.

Scientific shrimp culture has its origins in the early 1980s. In India, awareness about the potential of shrimp farming grew during the late 1980s, after demonstrations by MPEDA (Marine Products Export Development Authority). This led to heavy investment by many small-scale entrepreneurs and a few corporate firms, and nearly 100,000 ha were brought under shrimp farms.

The total area under shrimp culture today, including traditional farming, is about 150,000 ha. It benefits in all about a million people. Shrimp culture has had its share of teething problems, like any other nascent industry. These are gradually struggling towards solution.

But at one time the problems looked insurmountable. They were social — because of agitations against shrimp farming by several interests. There were health problems — shrimp were hit by diseases, particularly white spot. There were major legal problems — a landmark judgment of the Supreme Court that effectively crippled the industry. The few corporate interests wound up their shrimp farms and diversified into horticulture, building construction and other businesses.

The opposition to aquaculture has given rise to many myths. In sum, aquaculture is blamed for many of the ills that afflict coastal villages. Let us examine the myths, one by one.

1. *Shrimp farming is responsible for the reckless destruction of mangroves:*

It is true that expansion of shrimp culture has led to limited conversion of mangroves into shrimp ponds. (Mangroves were at one time regarded as wasteland — which is why they interested aquaculture investors.) But shrimp culture is just one of many coastal activities that impact on mangroves. To target shrimp culture alone while turning a blind eye to all the other causes of mangrove destruction is to betray bias against shrimp culture, unconcern for the scientific reality and indifference to the larger public good.

Non-mangrove areas have come to the fore in recent months, worldwide, for practice of semi-intensive or intensive shrimp culture. In China, shrimp ponds are mainly in non-mangrove areas. A recent study in the south of Thailand shows that only 14% of shrimp farms were originally mangrove areas. 49% were converted from rice fields, 27.5% were orchards, 6% consisted of unproductive land. However, in the Mekong delta of Viet Nam, clearance of mangroves both for timber and shrimp farming has been serious. It is therefore not right to generalize about shrimp farms destroying mangroves; the reality varies from country to country.

In India, the damage to mangroves from shrimp culture is negligible when

Selective harvesting of cultured shrimp helps obviate the need for complete draining of pond water.

compared with damage from municipal and industrial pollution, chemical runoffs, coastal reclamation for agriculture and industry, harbour construction and deepening, urban development, shipwrecks, the shipbreaking industry, etc.

Remote sensing surveys show that mangrove areas in Andhra Pradesh have actually grown in places where shrimp farming has developed the most. Where shrimp farming is shown to have destroyed mangroves, aqua farmers should be told to carry out a replantation programme.

It must be pointed out that mangrove areas are not the best places for sustainable aquaculture farms. Mangrove land supports profitable shrimp culture only for short periods. In semi-intensive or intensive areas, acid sulphate soils common in mangrove areas may affect the sustainability of shrimp culture.

2. *Aquaculture degrades the soil:* Agricultural degradation of soil is far worse and far more serious than any degradation on account of aquaculture, but there is no tirade against agriculture on this account.

Large quantities of chemical fertilizers and pesticides are used every year in India to kill pests, ward off disease and keep farm productivity high. More than 50% of the soil area has been affected by agricultural degradation. Bio-fertilizers are being publicised a great deal, but they cannot be produced in large enough quantities to replace chemical pesticides and fertilizers in the near future.

The main chemicals used in aquaculture are lime and chlorine. Chlorine is actually used everywhere to clean water. There is no scientific evidence that chlorine and lime lead to irreversible soil degradation. Further, most aquaculture in India is extensive, and does not need large applications of lime or chlorine.

3. *Seepage of salt water into farms, salinization of drinking water:* The coastal zone is not preferred for agriculture — it is saline because of the proximity to the sea and to creeks and estuaries. Thousands of acres of coastal land therefore lie idle in several states. But in a few states, shrimp culture is being practised in a small coastal area. One should be happy that shrimp culture is converting useless land to productive use.

As long as coastal aquaculture is confined to the coast, salt water seepage and salinization are not serious problems. It is only when farms are set up more than 500m from the high tide line that the problem of salt water seepage can become serious.

Of the 1.4 million ha available in India, aquaculture has developed on only 7% of the area (about 100,000 ha.) Of this area, productive agricultural land next to aquaculture farms is not even 2% or 2,000 ha. Of this 2,000 ha, land affected by salt water seepage is negligible.

But the question of salt water seepage is blown out of all proportion, and talked about as if all of agriculture and all the drinking wells along India's coastline have been affected by aquaculture. Has anyone assessed the magnitude of damage? This so-called damage should be set off against the large quantity of food that aquaculture can produce. At any rate, coastal waters have always been brackish. Wells dug in coconut plantations or on coastal land supply mostly brackish water (Chong, 1998, per com).

4. *Pollution of drinking water:* No survey has been conducted to assess the aquifers along the coastline or the quantity of fresh water available during the year. On the basis of a few complaints, the feeling has been created that drinking water wells all along the coastline have become saline due to coastal aquaculture.

NEERI (National Environmental Engineering Research Institute) has indicated that there is no damage to drinking water sources from aquaculture.

5. *Aquaculture affects marine life:* Effluents from shrimp farms actually increase the productivity of coastal waters. Example: the biological production and standing stock of lagoon fauna in Kuang Krabaen Bay of Thailand has increased many times over. Fishermen have increased their incomes.

6. *Aquaculture increases unemployment among rural women:* This is not true (See page 17.) On the other hand, aquaculture has generated new opportunities for both men and women by putting wasteland to use. While rice cultivation requires about 180 labour days per crop, aquaculture requires about 600 days per crop. Thus, it has not only added to employment, but also increased the incomes of the labour force. Many coastal areas face serious labour shortages, and labourers are actually being brought in from the hinterland.

Aquaculture is more labour-intensive than agriculture. Taiwan has 60,000 ha of aquafarms that produce nearly 500,000 tonnes of shrimp. They employ nearly 90,000 people directly in the farm and 500,000 people in aquaculture-related services. If one million ha are brought under aquaculture in India, they can generate 10 million jobs.

The aquaculture industry encompasses a number of activities — broodstock bank operation, hatchery production of seeds, nursery rearing, seed trading, farming in grow-out ponds, harvesting, pond-cleaning, transporting, deheading of shrimp, peeling, freezing, packing, manufacture of feed, therapeutics and pharmaceuticals, pond construction and renovation, manufacture of equipment (such as pumps, aerators, compressors, generators, pipes, electrical items, electronic water testing kits), net manufacture, processing and marketing including export-related activities. Together, these activities have considerable job potential. Educational and training institutes in aquaculture would provide skilled manpower.

7. *Aquaculture is an industry of the rich:* This is again untrue. More than 99 % of shrimp farmers belong to the small-scale sector. There are a few middle-level entrepreneurs. A dozen-odd companies that had set up large farms haven't done well — most of them have wound up their shrimp culture operations.

However, corporate firms that have entered the shrimp industry have helped develop the basic infrastructure for shrimp farms along with support services such hatcheries, seed and feed supply. They have also helped develop roads, communications and power supply in rural areas.

Shrimp farming is sometimes branded as an industry of multinationals. This is incorrect — not a single MNC at present is into shrimp culture in India. There are however some joint ventures set up with overseas technical know-how that handle the supply of inputs such as shrimp feed.

The time has come for everyone concerned with shrimp culture to learn

Making small-scale coastal aquaculture sustainable

The Aquaculture Foundation of India, based in Chennai, has received a $10,000 grant from Holland for a six-month experimental project. It will facilitate improved coastal aquaculture management and environmental sustainability in selected districts of Andhra Pradesh and West Bengal. This is to be accomplished through awareness-building, on-farm analysis, strengthening the institutional capacity of agencies concerned, and technical assistance.

The project will focus particularly on improving water, feed and soil management of shrimp farmers in East Godavari, West Godavari and Krishna districts (Andhra Pradesh), and North 24 Parganas, South 24 Parganas and Midnapore districts of West Bengal. It is to be implemented in co-operation with the fisheries departments of Andhra Pradesh and West Bengal, two NGOs (Sravanti and Ramakrishna Ashram) and the BOBP.

Under the project, select government and NGO staff will be trained to undertake rapid appraisals of coastal aquaculture farming systems. They will then carry out field work in select clusters of small-sized coastal aquaculture farms, using farming systems research methodology. Aim: to document present culture practices carried out by a cluster of farmers around one water source in each district.

The findings of the field work and the documentation will be presented at an expert consultation, which will bring together experts from government, industry and the NGO sector from India and abroad. A set of guidelines will be developed for sustainable small-scale aquaculture, covering topics such as pond site improvement and redesign, culture management, water quality management, feed management, effluent management and disposal.

A comic book will be developed from the guidelines, in Telugu and Bangla. It will be made available to fisheries extension officers and distributed widely to improve coastal aquaculture management practices among small-scale shrimp farmers.

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lessons from the past, and plan for a future of healthy growth — one based on the principles of sustainable development. The industry and the country have suffered enough since 1994 from litigation, disease and ill-informed criticism.

Sustainable shrimp farming in India requires the following steps:

1. *Identification of suitable areas for development of new farms:* A survey to identify suitable areas from the economic, technical, social, legal and environmental standpoints is essential. A location-specific community master plan should be prepared and publicly announced, to avoid all the problems the industry could face in future.

2. *Regulation of existing shrimp farms:* All existing shrimp farms need proper regulation from the environmental standpoint. Since they have been developed without any master plan, or proper guidelines and controls, a detailed survey is needed to identify defects and go in for corrective measures. This is essential to protect the environment and correct flaws in existing farms.

3. *Buffer zones in farming areas:* Saltwater seepage and salinization of wells and agricultural land should be avoided at any cost by setting up buffer zones in farming areas wherever required. This is essential for the survival of land-based coastal aquaculture. The government should come forward to create the basic infrastructure, and protect both coastal aquaculture and agriculture.

4. *Prevention of soil degradation:* Since aquaculture farms use a lot of chlorine and lime, many fear that shrimp farming areas will soon become a biological desert. Proper R&D is required to preserve the natural nutrients of the soil and prevent soil degradation.

5. *Preserving the quality of the environment:* This is very essential for sustainable shrimp culture. Like fisheries co-management, aqua co-management has to be practised by all farmers. As Dr Kee-Chai Chong of the BOBP puts it, aquaculture can be a "self-cleaning" sector. Self-imposed discipline is essential to keep the surrounding environment healthy and follow the principle of responsible aquaculture. Regular monitoring of water quality and environmental impact assessment should be carried out to minimize disease-related problems.

6. *Standardization of technology applications and inputs:* Technology is available for a range of shrimp culture systems — from simple extensive to super-intensive. But when disease breaks out, there is no standard technology to treat it. Shrimp farmers are therefore applying a lot of new inputs such as probiotics and immuno-stimulants and trying out their efficacy. To avoid virus infection, farmers are resorting to culture of tiger shrimp in low saline or freshwater conditions.

Greedy farmers always have a tendency to adopt semi-intensive or intensive farming techniques without grasping the implications of high stocking density. A "standard technology" package with the best available information has to be evolved.

7. *A national policy for aquaculture:* Aquaculture in India has always been under the shadow of agriculture. Its potential hasn't been sufficiently realized, its development opportunities not sufficiently tapped. Aquaculture is actually a multi-disciplinary science. It needs to be delinked from agriculture, even from fisheries, and studied and planned as a distinct development entity.

For sustainable development of aquaculture, the government should come out with a national policy for aquaculture, supported by legal and administrative structures and an appropriate budget. Only then will this nascent industry realise its potential, with benefits accruing to government, the national economy, exporters, small-scale fish farmers and fish lovers as a whole.

The Aquaculture Authority in India: What it is, what it does

A significant landmark in the history of shrimp culture in India is the setting up of an Aquaculture Authority (AA) by the Government of India. Such an Authority was recommended by the Supreme Court of India in its judgement of December 11, 1996, on shrimp farms in coastal areas. The Authority is now functioning under the administrative control of the Ministry of Agriculture, Department of Animal Husbandry and Dairying. This interview with the Chairman and the Member-Secretary of the Authority describes the structure and activities of the AA.

Q: Why did the Supreme Court of India consider an Aquaculture Authority necessary?

A: The Supreme Court said that the Authority should be constituted before 15 January, 1997, under Section 3 (3) of the Environment (Protection) Act of 1986. The Central Government should confer on the Authority "all the powers necessary to protect the ecologically fragile coastal areas, seashore, water front and other coastal areas" and "specially deal with the situation created by the shrimp culture industry in Coastal States and Union Territories."

The Court said the Authority should be headed by a retired Judge of the High Court. Other members would be appointed by the Central Government: persons with expertise in aquaculture, pollution control and environment protection. The Authority would have the power to issue directions under Section 5 of the Act, and for taking various measures concerning Section 3 of the Act.

The Authority would implement the "precautionary principle" and the "polluter pays" principle.

Q: Who is the chairman of the Aquaculture Authority? Who are the other members?

A: The Chairman is Justice G Ramanujam, former judge of the Madras High Court. The Member-Secretary is Dr Y S Yadava, Fisheries Development Commissioner, Government of India. Other members are Dr K Gopakumar, Deputy Director General (Fisheries), Indian Council of Agricultural Research; Mr. R H Khwaja, Joint Secretary, Ministry of Environment & Forests; Dr G R M Rao, Director, Central Institute of Brackishwater Aquaculture; Dr Satish Chandra, Retd. Director, National Institute of Hydrology; Mr. V Venkatesan, Director, Marine Products Export Development Authority; and Prof. R C Das, Retd. Chairman, Orissa Population Control Board.

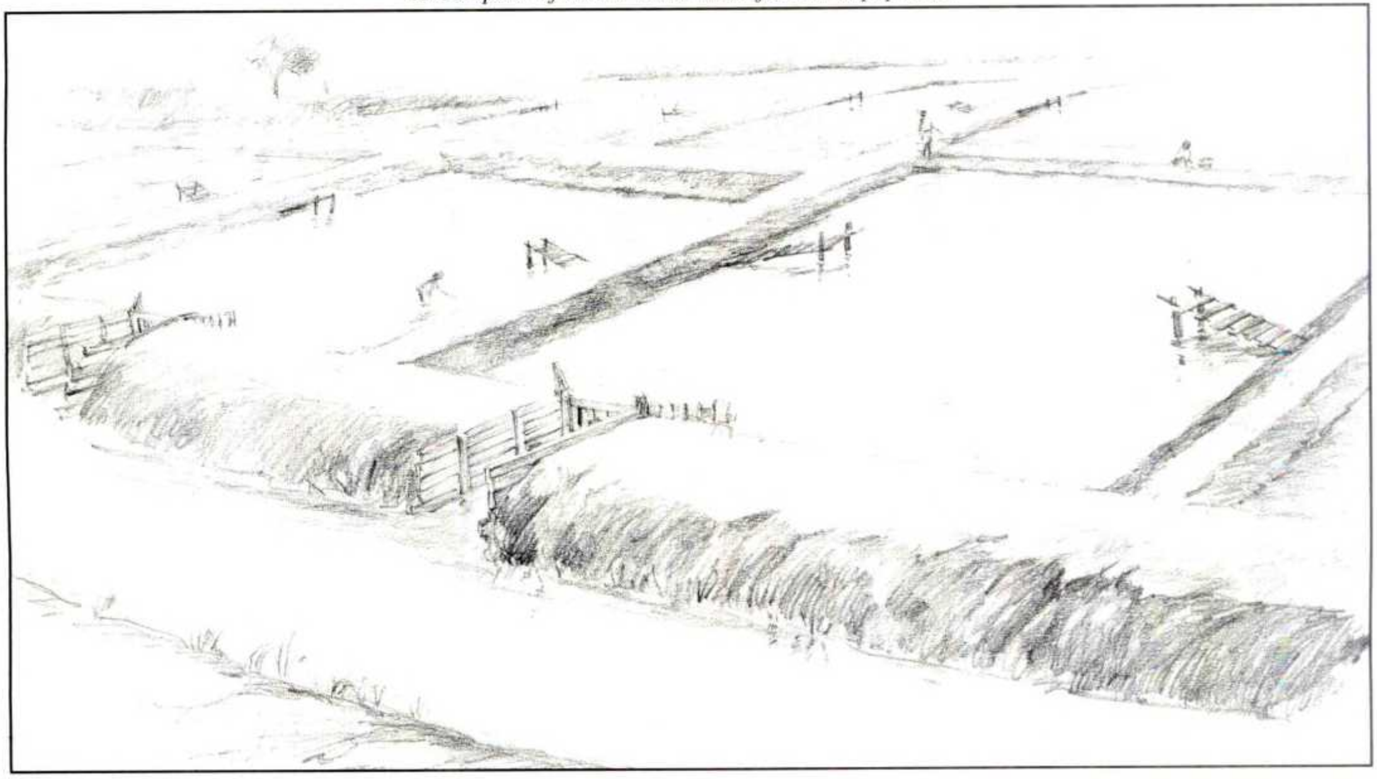
The Authority has its headquarters in Chennai, but meetings are held at various places in the coastal areas to discuss and take decisions on issues relating to shrimp culture.

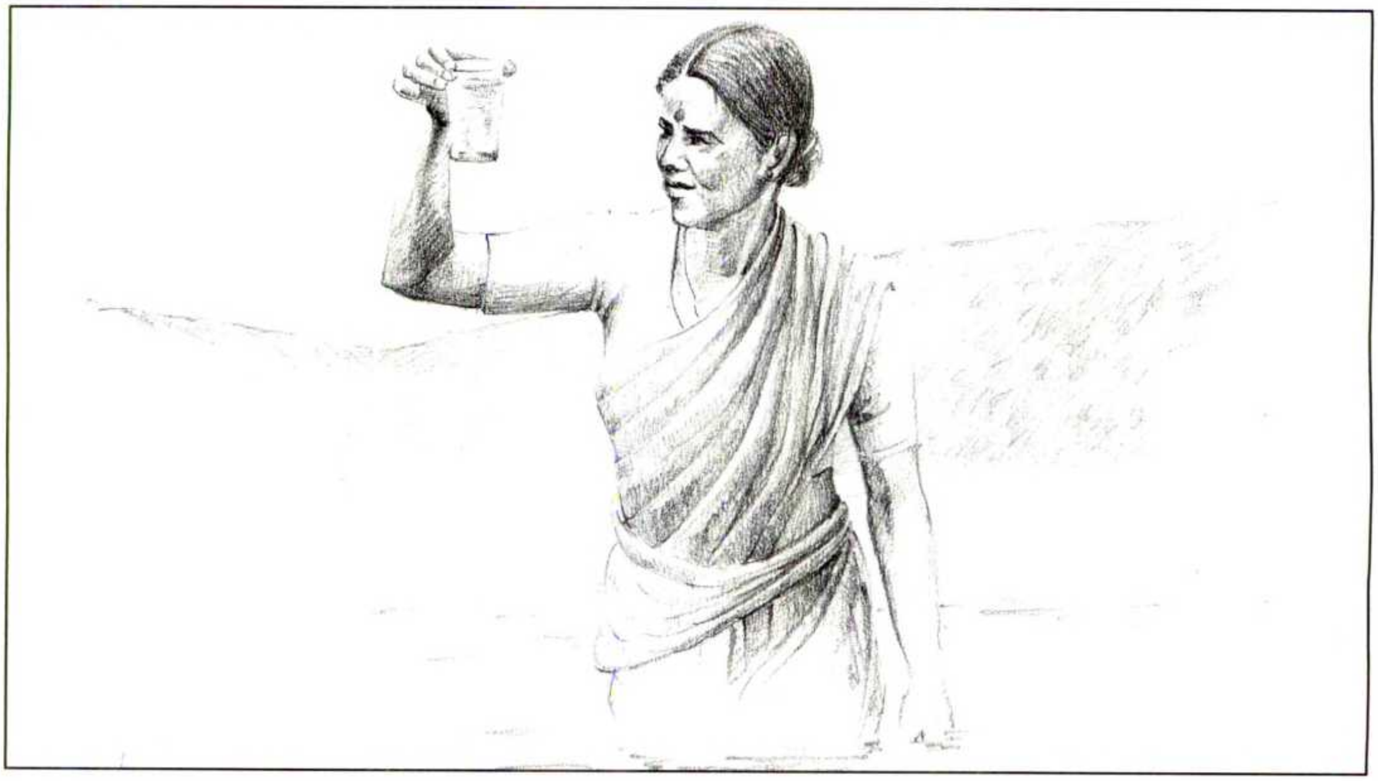
Q: How many meetings have been held so far? What was the agenda at these meetings?

A: The Authority has so far met eight times – twice in New Delhi, twice in Tamil Nadu, once each in Andhra Pradesh, Orissa, Kerala and Goa. Eminent persons in the fields of coastal aquaculture and environmental protection, besides private sector entrepreneurs etc, are special invitees to these meetings.

A half-day workshop is held at each meeting. The workshop exposes members of the Authority, most of whom are not aquaculturists, to various aspects of shrimp farming, and to

A complex of small-scale tidal-fed shrimp ponds.





Testing of water quality in a shrimp pond.

a wider perspective. For example, at the meeting in Kochi, a paper was presented by Dr John Kurien. He spoke on environmental considerations while undertaking shrimp culture activities.

The eighth meeting at Goa was attended by the Head of the Aquaculture Division of National Institute of Oceanography, and by a Joint Secretary from the Department of Environment. The Authority also met a group of shrimp farmers separately to ascertain their problems.

The Authority has finalised its rules and procedures for applications for new shrimp farms. It has accordingly delegated tasks to coastal states to process such applications and make their recommendations, since the States are familiar with local issues and locations. Every coastal state has constituted district-level and State-level committees to screen and forward applications for shrimp farms, along with the committees' recommendations. These are put up for the final approval of the Authority.

Thus, recent meetings of the Authority have started considering applications from shrimp farmers.

Q: How many applications for shrimp farms have been received so far? How many have been accepted?

A: More than four hundred applications have been received so far - from Kerala, West Bengal and Orissa. So far 49 applications have been approved.

Q: Does the Authority cover fresh water aquaculture as well?

A: No, the scope of the AA is confined to coastal aquaculture.

Initially, there was some confusion among aquaculturists, officials, etc., about the scope and functions of the Authority. A person who wanted to capture and export grouper from the Andamans was asked to seek the AA's permission. So was an NRI (non-resident Indian) from Trichi who wanted to start a turtle project. He got Government sanction, but he was asked to obtain an okay from the AA as well. We have clarified the specific issues which need to be referred to the Authority.

The AA's rules of procedure as well as the forms in which applications are to be made for the approval of the Authority etc. have been published extensively — in 18 or 19 newspapers in local languages of coastal states. We have issued press releases and advertisements. Important features of the rules of procedure have been publicised through fisheries magazines like *Fishing Chimes* (March, 1998).

I think there is now greater clarity and better awareness about what the AA is meant to do.

Q: An important part of the Supreme Court judgment is that farmers practising traditional and improved traditional systems of shrimp farming are allowed to adopt improved technology for increasing production, productivity and returns, with prior approval of the Aquaculture Authority. Has the AA decided on any measures to help them?

A: Yes, indeed. The Aquaculture Authority has already finalised comprehensive Guidelines for adoption of improved technology for the benefit of such farmers. The Guidelines lay down specific parameters for the adoption of improved technology by shrimp farmers, especially on design aspects, stocking density, pelleted feed, etc. They specify permissible activities on the part of shrimp farmers, and suggest measures the farmers should take to protect the ecosystem.

The Guidelines were formulated by a five-member technical committee set up by the Authority.

We believe that through these Guidelines, and other activities, the Aquaculture Authority is helping achieve the objectives of sustainable and eco-friendly aquaculture. **- S.R.M.**

SUSTAINABLE SHRIMP AQUACULTURE

A social scientist's perspective

by John Kurien

Some versions of modern shrimp aquaculture are desirable and sustainable, if they are subjected to larger social control .... Such control can be achieved if private initiative follows economic, ecological, technological and social norms collectively decided by the investors, the state and the community.

In January 1994, I was interviewed by the Delhi-based environmental magazine *Down to Earth.* The interviewer asked many questions on the emerging fisheries development and management scenario in India and around the world. My answers were based on my understanding of fisheries and the socio-economic and political milieu within which it functions.

When the interview was published, I was slightly taken aback. The interview was headlined "Indian aquaculture heading for disaster." Though I had not used these words, I had made a gloomy prognosis based on an analysis of the dynamics of a techno-economic intervention undertaken without the slightest social or environmental control, primarily for the pursuit of runaway profits for investors.

In this era of no-holds-barred globalization and the promise of the magic of the "free market", the fate that has befallen shrimp aquaculture in India indicates what we lose when we take short cuts to earning quick money — be it as a nation in desperate search of foreign exchange, or as private investors in the scramble for quick, easy profits. It also questions the widely held assumption that reasonable individual actions will necessarily lead to larger societal good. It highlights the tragedy of equating liberalisation and globalisation with the withdrawal of the state from regulating economic activity for the larger social good.

I personally believe that sustainable shrimp aquaculture is possible. It has actually been undertaken in my home state Kerala for hundreds of years. But then this system of shrimp aquaculture has been labelled "traditional" to give it the stigma that sticks to this world! It might have more scientifically been described as "low-energy, low-input, low-output, sustainable" shrimp culture. This would be in line with "modern" versions of shrimp aquaculture, that are more scientifically described as "high-energy, high-input, high-output, unsustainable" shrimp aquaculture.

"Modern" shrimp culture was introduced into Asian countries during the late 1970s in response to the insatiable demand for shrimp from consumers in developed country markets. They could not live with the unpredictability and seasonality of the marine harvest, which means that shrimp was not always on the menu in restaurants or the frozen food shelves of supermarkets. For perennial supply you need perennial production, hence the promotion of shrimp culture along the coastal tracts of developing tropical countries.

I'm not deriding shrimp culture. I'm not going to suggest that indigenous, traditional culture practices be extended

Cultured shrimp - a full-grown species of P. monodon.

Shrimp catches from the sea have declined in Asia because of four decades of incessant bottom trawling, says the author.

ad infinitum. This is neither a wise nor a feasible proposition. The point I wish to make is that even some versions of "modern" shrimp aquaculture are acceptable, desirable and indeed sustainable. But there is an important caveat which needs to be added: they are acceptable, desirable and sustainable, if they are subject to larger social control. And by social control I DO NOT mean nationalised or public sector aquaculture, but rather the exercise of individual private initiative within sound ecological, economic, technological and social norms collectively decided by the investors, the state and the community in which the activity will take place.

Unfortunately in India, we have seen nothing of this kind of modern shrimp aquaculture. Both big and small investors are guilty of flouting basic norms with regard to water treatment, use of antibiotics, seed quality, pond fertilisation, feeding ratios and effluent disposal practices. When the total number of farms in a given area is small, none of these objectively undesirable features create a problem. They get restricted to the confines of the individual farm. But as the numbers increase in anarchic fashion, because of the absence of social control, we are confronted with an invisible, impending disaster. It creeps towards a threshold beyond which it manifests itself as an "environmental surprise".

What each individual operator has "externalized" from his system affects others of his ilk. One farmer "internalizes" what is "externalized" by another via the common water intake system. We refer to this as "reciprocal externality." This results in a sort of mass industrial *harakiri* if you wish. But there is the other "unidirectional externality" where totally unsuspecting people who have nothing to do with aquaculture, but perhaps live near the farms, are affected in a variety of ways. Basically both these types of "externalities" have been generated in the brief history of the boom and bust of modern shrimp aquaculture in India. It happened in Taiwan, in the Philippines, in Thailand, in Ecuador, wherever unplanned shrimp aquaculture was practised in the 1980s and 1990s. Though in India we were one of the last to mount the cultured shrimp bandwagon, we did not learn from the tragic experience of others. This is for the simple reason that institutional memory is anathema to the dynamics of quick profiteering.

What we need to achieve sustainable shrimp aquaculture is something akin to the old "industrial estate" concept.

First, identify areas suitable for shrimp aquaculture on the basis of sound scientific advice, taking all relevant parameters into consideration. How appropriate these areas are must be ascertained by consulting with the community and enabling a genuine public hearing to assess the pros and cons of the location of a shrimp aquaculture estate.

Once such sites are selected, local bodies such as *panchayats* can provide all the appropriate infrastructure, particularly for water intake and effluent treatment, with funds from the Central Government, MPEDA or any other promotional agency. Plots in the estate would be given out on long-term lease, subject to a maximum holding size which bears some proportion to the total estate size. Rental should be fixed according to the "intensity" of the aquaculture to be undertaken. But the upper end of this intensity must be fixed in keeping with the carrying capacity of the total built-up and the natural ecosystem of the area. A system of positive discrimination must be worked out for those whose operations are less import-intensive, less input-intensive, less effluent-generating. This will ensure that individual and corporate-oriented shrimp aquaculture contribute to the greater societal goals of raising NET foreign exchange earnings, creating positive energy balances and lowering the level of effluent insertions into the ecosystem. The size of the "ecological footprint" of shrimp aquaculture can thus be greatly reduced. The sustainability of the ecosystem spectrum in producing cultured shrimp would be maintained.

The belief that the solution to the problem of declining shrimp catches from the sea lies in shrimp aquaculture is untenable. It does not ask why these catches are declining in the first place. At least in Asian waters, is it not due to

The rise, fall and recovery of shrimp culture

The early 1990s were the boom period of shrimp culture in India. Farmers set up shrimp farms in remote coastal areas and tried to create the basic infrastructure themselves. Ancillary industries and support services, such as shrimp hatcheries and feed mills, came up under the private sector. The Government encouraged shrimp farming to maximize foreign exchange earnings. It offered liberal bank finance and allotted land.

Then came the problems and they started mounting. Discharge of effluent. Poor water quality, which led to "choking". The breakout of virus diseases. Allegations of salinization of drinking water and of agriculural crops. People already suffering from drinking water scarcity, and travelling long distances to fetch it, said that shrimp farms had damaged drinking water wells.

The fact that some states in India were new to shrimp farming, the general ignorance of shrimp culture, and the lack of an extension service, led to shrimp farms becoming everyone's favourite whipping boy.

Opponents of shrimp farming in Tamil Nadu instituted a public interest litigation in the Supreme Court. The Tamil Nadu Government and the Union Government woke up very late to protect shrimp farming, and fought the case in the Supreme Court. NEERI, the National Environmental Engineering Research Institute, submitted an unscientific report based on a cursory study, charging shrimp farms with environmental pollution. The Supreme Court, in its ruling of December 11, 1996, ordered demolition of all shrimp farms within the Coastal Regulation Zone.

The Supreme Court later stayed its order, saving hundreds of thousands of small-scale shrimp farmers from ruin.

The Government of India proposes to introduce an aquaculture bill in Parliament. It is designed to ensure sustainable development of the shrimp culture industry, with safeguards to protect the environment and the social cause. Once this bill is passed, shrimp culture will be poised for healthy, sustainable growth.

Meanwhile, the Aquaculture Authority (AA) has been constituted as recommended by the Supreme Court. It has started functioning, with headquarters in Chennai. Applications for new shrimp farms are now being screened by district-level and state-level committees for forwarding to the AA. But the Surveyor General of India is yet to fix the high tideline as recommended by the Supreme Court. Meanwhile, some experts question the sanctity of a uniform width for the Coastal Regulation Zone, along a coastline that varies in topography from place to place. An environmental survey to identify sensitive zones is essential to prevent disputes.

- M.S.

over four decades of incessant and excessive bottom trawling? Why don't we address that issue first, by adopting more environmentally benign methods for harvesting shrimp in accordance with its natural seasonability? We could then merely "top up" the supply deficit with cultured shrimp.

My own analysis of state policies in several Asian countries about the promotion of shrimp harvests — first from the sea and then from the culture ponds — shows that history is repeating itself. The thrust of the policies is rather short-sighted. They merely aim at increasing hard-cash foreign exchange, irrespective of the social and environmental liabilities inflicted in the process within the country. We are guilty of promoting financial capital — which on yielding phenomenal private profits from aquaculture, moves on to other pastures, never looking back to see the damage it has inflicted on the nation's natural capital of land and water. All this must change, else we will end up writing a requiem for shrimp aquaculture.

Given the enormous foreign exchange potential of shrimp, I believe there is a strong case for creating a fund for shrimp resource management. This can be generated at both the consumer end and the producer nation end. A miniscule tax of about one cent on every kilogram of shrimp served in rich-country restaurants will yield a self-generating fund of a few million dollars. A consultant to some restaurant chains in the United States tells me that no consumer would mind this insignificant burden, provided the idea behind it — that this collection will be used as an "eco-restoration fund" — is well marketed.

Further, he cautions me that the fund should not be managed by environment - alists (!) but by a consortium of the stakeholders in the shrimp industry — from the retailers in the developed world to the producer organisations in the developing world. Fair enough. At the producer nation end, a small share of the foreign exchange earned can be earmarked for creating the infrastructure for "shrimp aquaculture estates" along the lines I mentioned earlier. It can also be utilised to reorient our marine shrimp harvesting and encourage more sustainable practices and bolster the yields from "traditional" shrimp aquaculture which has existed for centuries.

Ideally, ecological, social and economic space exists for a complementary process of shrimp capture and culture in Asian countries. Taking full advantage of these synergies in each realm will help us achieve a development and management regime for shrimp that is self-reliant — based on traditional and scientific knowledge, natural resources, human capabilities, entrepreneurship skills, technological prowess and promotional institutions.

Striving to achieve such objectives cannot be seen as part of a technological or managerial fix. It can be undertaken only in an institutional framework in which the state, the market and the community work in tandem. This is not a process without tensions. But then, new innovations and dynamic processes are generally the product of creative tension. When we speak of sustainable shrimp aquaculture today, crafting such institutional changes is the real challenge before us. All else is secondary.

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SMALL - SCALE SHRIMP FARMERS OF ANDHRA PRADESH FACE NEW CHALLENGES

by Charles Angell

The 70,000-odd shrimp farmers of Andhra Pradesh experienced a period of very rapid growth in shrimp culture, but then confronted major problems such as shrimp disease, pollution and legal conflict. Will the entrepreneurial spirit they have displayed as farmers be adequate to meet these new challenges?

During my seven-year tenure with BOBP as senior aquaculturist (1986–1993), I had the privilege of travelling around the region and witnessing the development of shrimp farming in India, Bangladesh and Sri Lanka. The BOBP played a role early in the shrimp farming story with its demonstration farm at Polekurru, East Godavari district, Andhra Pradesh (AP). This pioneering effort demonstrated modern methods of shrimp culture. Not surprisingly, the first shrimp farms of Andhra Pradesh sprang up along Polekurru creek.

My last visit to Kakinada as BOBP staffer came about late in 1993. Interest in shrimp farming was awakening, and a few daring entrepreneurs had started small farms. These founding fathers were developing management strategies to suit their individual circumstances. They demonstrated considerable ingenuity as they sought ways to minimize investment costs and risk. Even at that early stage, the then Deputy Director of Fisheries lamented the lack of a coordinated coastal zone management plan.

Early this year, I had the opportunity of returning to Kakinada during a short assignment with BOBP in early April. Mr B.V. Raghavulu, Mr A. Ramesh Babu and other members of the AP fisheries staff accompanied me during field visits and organized meetings with local farmers. It was nothing short of astounding to see the tremendous development of the industry in just five years. There is literally no space left for expansion! In contrast to the pattern of development in Nellore and further south in Tamil Nadu, the vast majority of shrimp farmers are small scale. Small shrimp farms have mushroomed along the shores of every available source of brackishwater. The picture painted in the press of a corporate- dominated industry is quite erroneous, at least in Andhra Pradesh. Farms larger than 2 ha make up only 3% of the total area of the 71,000 odd hectares of shrimp ponds in the state. About 56,000 ha are actual water surface.

When shrimp farming started in the early '90s in the Polekurru area, farmers depended on wild seed collected by hundreds of fishers in local estuaries. Import restrictions on feed imports made it very difficult to obtain manufactured feed. Local feed mills did not have the technology to produce efficient shrimp feeds. How the situation changed in just a few years as the Indian economy began to open up! Small private hatcheries mushroomed along the coast and imported feeds became available to small farmers. Shrimp seed supplies are much more reliable now and farmers can plan their stocking and harvesting with much less risk.

The numbers are really staggering! It takes almost 71,000 farmers to operate these ponds, which provide a good living for them and earn foreign currency for

A typical shrimp pond along the Saripalam Canal in Andhra Pradesh.

Pump set along the Saripalam canal.

the country as well. The industry has spawned 27 feed mills, 146 hatcheries and 46 processing plants in the state, creating much additional employment. Dr. R. Paulraj and his team from the Central Marine Fisheries Research Institute estimate that each hectare of shrimp pond requires 600 person days of labour per year compared to 180 for paddy.

Mr. K. Narasimharaja is typical of these small farmers. Mr. Narasimharaja sold his contracting business in U.P. and moved to Polekurru to set up his 1.6 ha shrimp farm along the Matlapalam Canal. "Shrimp farming is my business now and supports my family," he says. Mr. Narasimharaja purchases his shrimp post - larvae (PLs) from a local hatchery. I asked him if he had the PLs tested for white spot virus. "No, I can't be sure that the PLs they sell me would be from the same batch tested. But the large farm just downstream had their PLs tested and they got the virus anyway," he replied. Mr. Narasimharaja minimizes risk by stocking at low density, only 2 PLs per square meter. This is a typical response to risk among Andhra shrimp farmers. Although no studies have been done, these low stocking rates probably minimize discharges of organic matter, BOD and nitrogenous wastes. It is likely that most waste is digested within the pond itself.

Mr. Narasimharaja survived the severe outbreak of white spot disease in 1995 which wiped out his crop. Since then, the virulence of the virus seems to be declining. "Shrimp farming is my sole support – I must keep going," he says. As we discussed the problem of white spot disease and methods for controlling it, the subject of reservoirs was raised. Reservoirs have proved effective as a means of controlling several viral diseases on larger farms. "I cannot afford to include a reservoir. My farm is too small. If I convert some of it to a reservoir, my profits will be wiped out. My main problem is polluted water in the canal from which I draw water for the farm!" he exclaimed.

Mr. Narasimharaja's farm, like all of those along the Matlapalam Canal, was constructed above the high water mark on saline clay soil. This zone was formerly covered with halophytic plants, mainly *Salicornia*. Such soils are very common in coastal areas and are unsuitable for agriculture. The adjacent mangrove forest reserve has not been encroached on by shrimp farms. As Mr. Narasimharaja noted, the major problem in this area, as in many others, is the poor quality of water supplied.

A visit to the Saripalam Canal in West Godavari District revealed the adaptability of small- scale shrimp farmers. The soil along the canal is slightly saline, although aman type paddy can be cultivated during the wet monsoon. Hence, there is a mixture of paddy and shrimp farming. Paddy is cultivated during the wet monsoon, while shrimp are farmed during the dry season. In fact, when the shrimp ponds are initially filled with fresh water from the canal, the salinity rises to 4 or 5 ppt! Ground water is naturally saline at 4 to 5 ppt. This has been so since the area was settled and is not the result of shrimp farming activity. The Saripalam Canal has become silted; farms along its course get little brackish water.

Some of the farms, like that of Kedasu Kamakaraju, are very small indeed. His is only 0.14 ha. Mr. Kamakaraju stocks at low density, uses hatchery seed and manufactured feed. Some of the ponds are too shallow, and the farmers need some technical assistance to help them with pond management. Outbreaks of white spot disease have been very sporadic in the area. Some farmers were heavily impacted, others not. The farms

Sampling of shrimp in a pond along the Saripalam canal.

in the Saripalam cluster are squeezed between the higher elevation paddy fields and the canal. There is no room for reservoirs, either common or individual. Here too stocking densities are very low – this minimizes waste treatment and disposal problems. No aeration is required with the present management strategy.

I saw many other examples of small-scale shrimp farming in East Godavari, Krishna and West Godavari districts. Hundreds of small farms hug the banks of the Krishna River, occupying former vegetable gardens. Many of these farms are poorly constructed. The ponds are so shallow that benthic algal mats choke off the oxygen supply. During my visit, sporadic outbreaks of white spot disease were already beginning to affect some of the farms. The fisheries department is stretched too thin to adequately serve the hundreds of farms, so the latter depend primarily on occasional advice offered by feed company representatives.

With so many farmers around, it was possible to visit only a small number. Mr. Raghavulu and his staff had organized discussion groups with farmers in each of the districts, so we were able to get a feel for the problems and prospects faced in each of these districts. White spot virus attacked almost all farms in 1995. Sporadic outbreaks continue, but there does not seem to be a clear pattern now. One of the commercial feed mill companies has set up a laboratory for testing hatchery PLs for white spot virus. The small farmers we talked to expressed skepticism over the efficacy of the tests: they said the only large farm in Polekurru used PLs which tested negative for the virus but were wiped out anyway. Furthermore, the hatcheries are unwilling to test small batches of PLs. These unorganized farmers have no leverage either with the hatcheries or with other suppliers of inputs such as feeds and fertilizers.

Our discussions with small-scale shrimp farmers in the three districts revealed that there are no associations or groups which deal with management issues. Although farms have developed in clusters along water sources, there is no attempt to coordinate discharges and share information and knowledge. Smaller farmers tend to blame larger operators for problems. Some lively arguments ensued during our discussion groups!

Experience in Thailand and Sri Lanka has demonstrated the effectiveness of reservoirs in managing water quality and reducing the risk of white spot virus disease. Very small farms like those found in Andhra Pradesh are unable to incorporate even separate drainage and water supply canals, let alone large reservoirs. There are no buffer zones between farms along most of the canals, hence no space is available. If 20 to 50% of the farm would be converted to reservoir, profits would be wiped out. Some farms could intensify their technology and boost production to justify reservoirs, but this would bring in a host of new problems.

The pond dynamics of the area have not been sufficiently studied, although much is made of shrimp farming as a source of pollution. This may indeed be the case with intensive operations, uncommon in Andhra Pradesh. The low stocking densities and low feed application employed by most Andhra farmers probably contributes little pollution to adjacent waterways. Before any conclusions are reached, some good field studies are needed to identify what pollutants are discharged, if any.

Protests by environmentalists and social activists culminated in 1996 with a decision by the Supreme Court of India banning all shrimp farming within 500 metres of the high water mark. Although aimed primarily at industrial shrimp farmers, it posed a fatal threat to the small- scale farmers of Andhra Pradesh. At the same time, the Court directed the government to establish an Aquaculture Authority (see pages 7-8). The AA was given the power to issue licenses for traditional and improved traditional farms within the Coastal Regulatory Zone (CRZ). Naturally, every farm in the CRZ claimed to be of the improved traditional type[1]. AA has indeed granted licenses to many of the small farms.

The Aquaculture Foundation of India, under the leadership of Dr. M Sakthivel, one of the great pioneers of shrimp farming in India, is promoting legislation at the national level which will treat aquaculture as a legal activity in the CRZ. While the legal crises are being met, it will be incumbent on the industry to prove that it is a responsible steward of coastal resources. Given the meagre resources of the state fisheries departments and the disorganization of large numbers of small-scale shrimp farmers, this will be no easy task.

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[1] *Dr. Alagaswamy of the Central Institute of Brackishwater Aquaculture, Madras defined improved traditional shrimp farming as similar to tide - fed traditional farming but with controlled stocking in ponds of 2 to 5 ha. The AAI has allowed pumped water supply provided the other conditions are met.*

ENVIRONMENTAL AND SOCIAL ISSUES IN COASTAL AQUACULTURE – A CASE STUDY

By R. Paulraj, M. Rajagopalan, M. Vijayakumaran, E. Vivekanandan and R. Sathiadhas*

How does shrimp farming impact the environment and the lives of coastal populations? The authors summarize the results of a study conducted in nine coastal areas of a district in Tamil Nadu. They analyzed soil, water and plankton samples, obtained data from the landings of marine fish, and interviewed hundreds of fisherfolk. Conclusion : No negative impact, some positive impact.

Sustainable utilization of land and water resources is vital if a developing country with a large population, such as India, is to ensure nutritional and livelihood security for its people. Coastal aquaculture offers vast scope in this context; it provides opportunities for utilizing the saline wastelands and water resources available along the 8,129 km-long coastline of India.

More than three million hectares of coastal soils are reportedly affected by saline subsoil water, rendering it unsuitable for productive agriculture. Of these, 1.2 million hectares are considered suitable for the farming of marine organisms in brackishwater and seawater based systems. A variety of cultivable indigenous marine species which have nutritional, therapeutic, ornamental or industrial value, are available along the coast.

Although coastal aquaculture is several decades old in India, culture operations have by and large have been confined to the states of West Bengal, Kerala and Goa. The explosion in world demand for shrimp, and the short supply from capture fisheries, led to the growth of commercial shrimp farming in the early 1980s. This became an important industry during the late 1980s. The attractive returns from shrimp culture drew small and marginal farmers as well as corporate entrepreneurs into the business. Result: a variety of shrimp culture operations — extensive, improved intensive, and semi-intensive. By 1984, a total area of about 43,000 ha was under shrimp culture. Traditional extensive culture was practised in most of this area. It yielded a total production of 15,000 t and an average yield of 0.4t/ha. Shrimp culture witnessed rapid growth during the next 10 years. A total of 100,700 ha was brought under culture during 1994-95, leading to a production of 83,000 t and an average yield of 0.8 t/ha. Since that time, though the area under farming increased to 1,36,000 ha during 1996-97, there was a substantial fall in production (to about 70,000 t), and in average yield (to about 0.52t/ha), mainly on account of disease outbreak, and partly on account of legal disputes stemming from social and environmental concerns, particularly in Tamil Nadu.

Some of the coastal villagers believe that brackishwater shrimp farming is detrimental to human habitation. The following are their major claims and apprehensions: (i) Most of the shrimp farms are converted farmlands; agriculture may not be feasible in future in these areas. (ii) Stagnant brackishwater in shrimp ponds seeps through the soil and makes potable well water brackish. (iii) Untreated effluent water from shrimp farms is allowed to stagnate around farms and dwellings, posing health hazards. (iv) Many agricultural labourers are displaced because of a decline in agriculture on account of shrimp farming. (v) Fishing by coastal fishermen suffers.

To assess the effects of shrimp farming on the environment and on the coastal population, a study was undertaken in Nagai Quaid-E-Milleth district, Tamil Nadu, in September 1995. Several small and large farms in nine coastal areas were covered by the study. Soil, water and plankton samples were collected from inlets and outlets of the farm areas, from shrimp ponds and from the wells of nearby villages, and analysed. Estimates were made of hydrological parameters, nutrients, bacterial counts in the water and soil samples. Data on marine fish landings for the relevant

Stocking of shrimp seed in an aqua farm in Nagai Quaid-E-Milleth district, Tamil Nadu

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*The authors are from the Madras Research Centre of CMFRI (Central Marine Fisheries Research Institute) in India.

fishing villages, which were available with the CMFRI, were analysed.

Socio-economic data were collected on the basis of interviews with hundreds of fisherfolk and villagers.

LOCATION OF SHRIMP FARMS

The total geographical area of Sirkazhi, Tharangampadi and Nagapattinam *taluks* is about 1.07 lakh hectares (source: Assistant Director of Statistics, NQM District). The net sown (agriculture) area in these three *taluks* accounts for 57%, 60% and 58% of the respective total geographical areas.

The area acquired for shrimp farming in the district is about 2,000 ha, which is less than 2% of the total area. The area developed for shrimp farming is about 800 ha. Shrimp farming has paved the way for utilisation of barren, uncultivable lands. The land, which was under cultivation about 20 years back, became uncultivable – or cultivable with the prospect of just one crop per year – because of inconsistent water supply, as this area comes under the tail end of the Cauvery irrigation system. Hence, farmers were frantically looking for an alternative use of this land for the last few years.

Shrimp farming activity in the district commenced on a small scale in 1991 and became intensive from 1993. The shrimp farms are spread over 31 villages of Sirkazhi, Tharangampadi, Nagapattinam, Thiruthuraipoondi and Vedaranyam *taluks*. In these *taluks*, more than 100 farms are in operation. All the farms are located near the coast or in the vicinity of estuarine systems where adequate saline water supply is available. For understanding the nature of soil and water prior to the commencement of shrimp farming, a 1984 map of the Soil Survey and: Land Use Organization, Government of Tamil Nadu, was referred to. The soil in the shrimp farming areas is mostly sandy, coastal alluvial or unconsolidated, excessively drained and rapidly permeable. According to the 1984 survey, the coastal area was affected by surface and sub-surface salinity and alkalinity. In Thiruthuraipoondi, Nagapattinam and Sirkazhi *taluks*, where most of the shrimp farms are located, about 4,814 ha, 1,502 ha and 13,807 ha of the coastal areas were affected by surface, sub-surface and complete salinity respectively in 1984 itself.

In its Special Report No. 85 (1994), the Soil Survey and Land Use Organization (SS and LUO) and Soil Testing Laboratory, Aduthurai, Tamil Nadu Agricultural University, concluded that all the shrimp farms surveyed are located in uncultivated wastelands where crops have not been raised for the last 20 years.

ENVIRONMENTAL CHARACTISTICS

Prior to the commencement of shrimp farming in coastal areas of the district, the Tamil Nadu Government estimated that about 75% of the coastal area in the district is saline in nature either in the surface or in the sub-surface or both. The cause of salinity in the soil is a combination of factors – geographical, climatic, hydrological, monsoonic etc. The survey also showed that 80% of the soil is highly alkaline (pH 8.5). In 1984, the Tamil Nadu Government recommended shrimp farming as a venture with potential for improving the socio-economic conditions of the population in Nagai Quaid-E-Milleth district.

The quality of ground water in the entire coastal area is saline. Water samples collected from the bore holes of aquifers in the depth range of 3-294 mm (SS and LUO, 1984) reveal that the quality of medium and deep aquifers is moderate to poor. Though the top aquifer is better in quality, the potential is not sufficient for irrigation.

As all the shrimp farms are located in the marine deposits, the quality of ground water is already brackish, as established by the Public Works Department (SS and LUO, 1994). Hence the possibility of pollution of ground water (which is

Women assess the quality of shrimp seed in Nagai Quaid-E-Milleth district, Tamil Nadu.

already brackish) by the aquaculture farms is minimum.

In general, ground water is not used by aqua farms. Many farms which were using ground water stopped doing so because of the regulations of the Tamil Nadu Government. Presently all the shrimp farms use saline water either by pumping from the sea or from the backwaters.

Analysis of the hydrological parameters in the water samples revealed the following features:

The possible negative effects of unregulated shrimp farming like significant increase in Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) and eutrophication of creeks and estuaries due to high nutrient shedding from farm effluent were not evident in any area surveyed during this study (Table 1). The TSS, BOD, COD and nutrient levels were within permissible limits in all places with a few exceptions.

Marginally high BOD levels were recorded in the outlet canals of two farms. In one of the farms, there was no culture activity since July 1995, and in the other, the farming was in the initial stage, with very limited exchange of water. The increase in the BOD was due to stagnation of water in the outer canal.

Table 1: Comparison of admissible levels of different parameters in the effluents discharged in estuaries and the actual range of estimates in the farm outlet water [All values (except pH) are in mg/1.]

	Admissible Level		Estimated Range
Parameters	**Pollution Control Bd (TN Govt.)**	**Min. of Agri. (Govt. of India)**	**Present Study**
pH	5.5 - 9.0	6 - 8.5	7.4 - 8.00
DO (minimum level)	3	3	3.1 - 8.8
BOD	50	20	1.4 - 22.8
COD	100	75	54.5 - 103.6
TSS	100	100	41.4 - 123.0
Ammonia	1	0.5	BDL - 1.0
Phosphate	5	0.2	0.025 - 0.25
Heavy Metals			
Copper	3	-	0.052 - 0.317
Chromium	2	-	0.015 - 0.105
Zinc	1	-	0.2 - 0.3
Cadmium	2	-	BDL - 0.003
Lead	0.1	-	BDL

BDL : Below Detectable Levels.

A marginal increase in the TSS was noticed only in the outlets of small farms (2 to 5 ha area) along Kaduvaiyar, Vellayar and Vedaranyam Canal. This was mainly due to high levels of TSS in the estuarine inlet itself.

Concentration of heavy metals was negligible in the effluent of all the farms.

Since the nutrients in the outlet are within permissible limits, they did not create plankton bloom in any of the farms – except in the stagnant outlets of one non-functional farm. It is reported from Finland that low-level enrichment of sea water by farm effluent increases congregation of fish up to 10 times in the discharge areas.

Though zooplankton concentration was higher in a few estuary-based ponds, the concentration was normal in the outlet water. Similarly, there were no marked differences in organic carbon in the pond inlet and outlet waters.

Barring one farm in Poompuhar, the bacterial population in the pond water and outlet were not very different. Coliforms count was high in both water and soil in all the farms.

In a few places, agricultural activity was being initiated right across the peripheral bunds/canals of farms, indicating that paddy farming could be undertaken, provided freshwater is available in the vicinity of shrimp farms.

Water in the agricultural fields, in the freshwater ponds, and in the wells near the shrimp farms, was almost fresh; but alkalinity was high in some places due to alkaline soil.

It is likely that the concentration of TSS, COD and nutrients in the farm effluent might increase towards the end of each crop. It is noticed that most of the larger farms incorporate effluent treatment plants in their existing design. Effective use of effluent treatment system will reduce the concentration of these factors in the farm effluent.

To control disease, the current trend is to drastically reduce water exchange by recycling the treated effluent. This is a welcome sign, since the quantum of water used will be less.

SOCIO-ECONOMIC IMPACT OF SHRIMP FARMS

Shrimp farming has considerably increased the value of land in the respective areas. Before the commencement of shrimp farming, the land value in coastal Nagai Quaid-E-Milleth district was only Rs.18,000 - 20,000 per ha. This went up 10 times to about Rs.1.8 lakhs per hectare. More than 60% of the coastal villagers accepted the fact that their land value has increased due to shrimp farming in their area.

Further, a major impact of shrimp farming was on the change in land ownership pattern in the coastal areas. About 19% of the coastal land holdings were sold due to the small size of the land (less than one ha.), 39% were sold to capitalize on high prices, 33% due to inadequate profitability in crop production and about 8% due to non-availability of labour. Traditional agriculturists in the coastal areas have profitably utilised the money realised from the sale of their lands to buy fertile farmlands away from the shore.Those who have bought the lands for shrimp farming are mostly from other regions.

Employment opportunities have gone up because of shrimp farming. The average labour requirement per ha. of paddy cultivation is about 180 labour days per crop, whereas in shrimp farming it is about 600 labour days/crop. Only one crop of paddy (and that too unreliable) can be raised in a year as against the possibility of two crops in shrimp farms. Most out-of-work farm labourers have been absorbed in shrimp farms, besides a considerable number of unemployed youth.

It was observed that shrimp farms required fewer female labourers than paddy cultivation did. About 30% of the labour in paddy farms is female. Since women are paid lower wages than men, they are much in demand in paddy fields of adjoining regions. So the growth of aquafarms has not made any difference to their employment prospects. But aquafarms have created regular jobs for a substantial number of male agricultural labourers. Aquafarms have also boosted job prospects in subsidiary occupations like catering, transportation and handling of construction materials etc. Agricultural labourers, on an average, earn an annual income of Rs. 7,500, whereas shrimp farm labourers earn Rs. 12,000. Hence the household income of families in this area has gone up considerably. The conditions of roads in several villages have improved, following the advent of the shrimp culture business.

Shrimp ponds under preparation.

EFFECT ON MARINE FISHERY

Has shrimp farming affected the fishing activities of fishermen? Data on marine landings in Nagai Quaid-E-Milleth District, available with the National Marine Living Resources Data Centre (NMLRDC) or CMFRI, Kochi, were analysed for the four-year period from 1991 (before commencement of intense farming activity) to 1994. There was no major change in the effort and in the annual fish landings during the period (Table 2). Thus shrimp farming activity has not made any difference to fishing activities of coastal fishermen.

RECOMMENDATIONS

The EIA study did not reveal any significant adverse impact from shrimp farming on the environment in the Nagai Quaid-E-Milleth District. Of late, awareness of the need to preserve the environment has been rising among small and large farmers and the corporate sector. For sustainable shrimp farming, the following measures are recommended:

Some villagers fear that impounding sea water may cause high salinity in the adjacent lands because of possible downward and lateral movement of saline water. Mobility of saline water towards higher elevation will be a minimum, and can be arrested by cutting a deep trench in the buffer zone, 4.5 m away from the pond. The trench may be 1.8 m deep, 0.9 m wide and may be lined with clay. The water collected in the trench may be drained through the outlet canal.

A biopond for treating pond effluent is recommended for groups of small farmers and large farms. The usage of sludge - digesting microbes for the management of pond detritus and the prevention of black mud formation at the bottom of the culture ponds as well as in the biopond is also recommended. The treated water should not be allowed to stagnate in discharged canals. To maintain free flow of the treated water, desilting of the creeks and opening of bar mouth of the estuaries as and when required, is necessary, as being done by one of the farms.

In order to reduce organic matter and plankton load, secondary aquaculture of shell fish (green mussel, edible oyster, and clams), finfish (mullets, chanos, pearl spot) and sea weed, depending on the suitability of sites, is recommended.

The guidelines issued by the Ministry of Agriculture, Government of India, and the Tamil Nadu Aquaculture (Regulation) Act 1995 for sustainable development and management of brackishwater aquaculture, may be followed.

Table 2: Annual fishing effort (in thousands of fishing hours) and catch (tonnes) from major gears in Nagai Quaid-E-Milleth District, Tamil Nadu

	1991		1992		1993		1994	
Gear	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch
Gill Net	1387	15400	1030	12911	1213	5108	1549	17244
Bag Net	20	2785	16	5649	12	3346	27	3385
Hook & Line	29	196	45	262	18	157	39	264
Other Gears	-	634	-	1910	-	1933	-	510
Total	-	19015	-	20732	-	20544	-	21403

WANTED: INFORMED COMMUNICATION IN COASTAL SHRIMP AQUACULTURE

By Kee-Chai CHONG

Communication is vital to development. Informed and responsible communicators discuss development challenges and opportunities. They monitor development practices to ensure that they are consistent with the national good. They highlight errors of omission and commission on the part of the development practitioners – the government, private enterprise or individuals.

An issue that has aroused a great deal of development interest in recent years is coastal shrimp aquaculture. Much has been written about the subject in recent months. I am sad to say that some of the writings have lacked substance and depth, or even objectivity and balance. In some, communication mischief may be intended! We badly need informed and responsible communication on the subject.

The critics of shrimp aquaculture have savaged it on many grounds. That it destroys mangroves, degrades the soil, causes salinisation of drinking water, generates pollution through toxic effluents, undermines the health of marine life, displaces coastal inhabitants, affects the catches and earnings of fisherfolk. India's Supreme Court, in its order of December 11, 1996, banned all shrimp farms within 500m of the Coastal Regulatory Zone.

As a result of the order, production fell and many people were put out of work. The country lost valuable foreign exchange. Further, environmental degradation continued – because shrimp culture is not the sole cause of environmental havoc, contrary to what some critics would have us believe.

Shrimp aquaculture has indeed had some undesirable impact on the coastal ecological landscape and seascape. But it is not shrimp aquaculture *per se* that is at fault but a small minority of producers, in particular large-scale capital-intensive operators. Many of these large-scale capital-intensive operations have gone out of business due to bankruptcy. Small farms or small-scale low-capital operations continue to operate successfully with little or no environmental impairment, in India and other countries.

Blaming aquaculture for the sins of some practitioners, and imposing severe bans on all aquaculture operations, is as logical as closing down all road traffic because some vehicle drivers are rash. Just as an oil spill is the result of careless navigation, the unintentional destruction of mangroves by coastal shrimp aquaculture is an accident, driven by the effort to minimize costs and maximize profits.

There's no industry that is problem-free. A responsible approach would be to address problems and attempt to solve them, so that the industry runs on healthy lines, rather than campaign to close down the industry. On the issue of shrimp culture, all stakeholders must strive for responsible and sustainable operations, so that we help an industry that provides jobs and incomes, boosts foreign exchange earnings, and has tremendous development potential.

A Code of Conduct for Communication

Solutions to development problems lie in spreading awareness about both the positive and negative impact of development. Consensus-building, negotiation, mediation, dispute settlement and compromise are vital

Shrimp culture is only one of many activities that impact on mangroves, says the author. (Mangroves from Pichavaram reserve, Tamil Nadu)

Communication among stakeholders – to establish a convergence of perceptions and opinions, work out compromises and solve problems - is vital, says the author. (Photograph shows a BOBP supported stakeholder and consensus consultation)

processes in such a dialogue. All stakeholders must engage in open communication, which can promote better understanding and appreciation of one another's stakes. Mere hostility, through the media and other fora, vitiates the climate for agreement. Perhaps a code of conduct for responsible communication is called for, just as a code of conduct for responsible aquaculture has been promulgated to guide its future development.

Many of today's generation are schooled in environmental sciences or sensitized to them – in particular to integrated coastal zone management as an approach to resolve multi-resource user conflicts. In recent years, they have also been exposed to participatory planning and community-based approaches to resource development and management. They are more open to communication on these subjects now than in the past - when exposure to environmental science was negligible. They are quite willing to listen to informed criticism, accept any mistakes and change their course of action. But the criticism has to be responsible and well-founded.

Early Portrayal of Mangroves Led to its Unsustainable Use

Take the subject of mangroves. Society is partly responsible for the conversion of mangroves to coastal shrimp aquaculture. In the 1980s and earlier, mangroves in the tropics and subtropics were described as mosquito-infested and disease-afflicted wasteland. In fact, society even dismissed them as undrainable, unreclaimable and unproductive for agriculture. (See page 2)

This is because mangrove soils are mostly acid-sulphate soils and waterlogged — unsuitable for most development or commercial activity. Even fish do not thrive in such acid sulphate soil-based water conditions. We did not know better then. Nor was technology available then to reclaim such areas. Clearly, technology and human ingenuity were needed to overcome these constraints.

Urban sewage gets discharged into the sea off Royapuram - one of the many causes of coastal pollution.

Later, this so-called wasteland turned out to be suitable for aquaculture. It is precisely the early portrayal of mangroves as wasteland that drew aquaculture investors looking for sites, especially when the life cycles of marine finfish and shellfish were closed and scientific breakthroughs in fish feed formulation occurred. In the Philippines, mangrove areas were leased for milkfish culture for one peso per hectare per year!

Governments all over the world look for economic engines to drive their national economies. They particularly look for foreign exchange earning opportunities. Any government must explore all possible development options. Although marine finfish such as milkfish and mullet were the first candidates for culture, the insatiable world demand for shrimp led to its early intensive culture in the mangroves, amidst low-intensive or extensive small-scale operations. To be sure, some of the small farms also switched to intensive production to cash in on the growing demand for shrimp. Coastal shrimp aquaculture provided the economic engine; the rest is now history .

Scapegoat for Mangrove Destruction

Of all the causes of mangrove destruction, why is coastal shrimp aquaculture singled out as the main villain? One would assume that if there is no coastal aquaculture, mangroves would remain virgin land. This is not so. Land-locked countries where coastal shrimp aquaculture is not possible are ravaged by villains of many kinds: landfills and other kinds of reclamation for urban and industrial development that denude the land. As for coastal areas, oil refinery installation, dredging for deepening shipping channels, sand mining, shoreline or beach erosion, municipal and industrial waste discharge, shipbreaking, dry-docking shipyards etc. are equally damaging to the coastal environment and to mangroves. Not to mention oil spills. These causes of coastal area degradation and mangrove destruction hardly arouse much interest. In fact, even agriculture and forestry practices are more injurious to the environment. So are industrial and manufacturing activities.

What about damage to coral reefs – which are excellent natural buffers against storm surges and inundation? The reefs are systematically denuded and destroyed by coral mining, extensive deforestation, municipal sewage discharge, etc. When disasters strike along the coast, partly because of the destruction of coral reefs, no one is spared. Loss of life and property is suffered not only by coastal communities but by everyone, including shrimp investors. The media report these disasters, without identifying and laying bare the causes of the disasters — coral mining, deforestation, sewage discharge etc.

For reasons yet to be determined, coastal shrimp aquaculture suffers from an image problem. Is it because it is supposed to produce a commodity for the "haves" rather than the "have-nots"? Profit margins in shrimp culture are said to be large, at US$ 4-5/kg. Do such margins provoke social envy, raising questions about who benefits from them, and whether such margins are sustainable?

Women help prepare shrimp pond in Andhra Pradesh - highlighting the potential of coastal shrimp aquaculture for jobs and development.

The Five Communication Effects

Shrimp aquaculture produces food, even if it is only for the haves right now. But it is produced by the have-nots, who stand to benefit. In Indonesia, a 25 year fisheries planning model completed in 1992 showed that by 2010, no shrimp will be available for export because domestic demand will absorb all of the shrimp output. (Chong, 1992)

Changes to the natural state of a resource base are inevitable when they are used by human beings. Resource modification is part and parcel of development to sustain living conditions. Accidents in the form of resource damage can and do occur. No resource can remain in a virgin state, so long as there are people.

Theodore Levitt talks of five communication effects: source effect, sleeper effect, message effect, communicator and audience effects. When one assesses source and message effects, one must examine the credibility of the message source or sponsor, the nature of the message, its purpose, its objectivity. Communicator and audience effects deal with the impact the communicator produces on the audience, whether the audience is sufficiently competent to receive the message and act on the message in a responsible manner. The sleeper effect describes the declining influence of the source or its credibility over time.

In coastal shrimp aquaculture, the sleeper effect is beginning to take effect. Evidence and experience are beginning to show that the destruction of mangroves and of the coastal environment due to shrimp aquaculture is not as severe as it is made out to be. Such degraded sites are slowly recovering and being recolonised. Aquaculture disease outbreaks are better understood with the help of research, and prevention methods are being developed to prevent its recurrence.

It is high time therefore that communication on coastal shrimp aquaculture improves and matures, and is motivated by the broader national interest – so that a valuable development opportunity continues to be tapped and an emerging industry survives and strengthens.

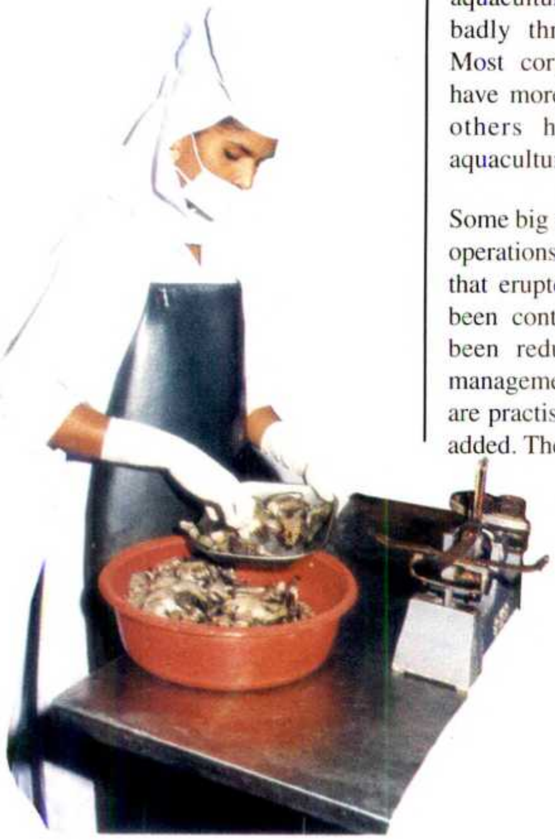
"THE SHRIMP INDUSTRY WANTS TO PURSUE ECO-FRIENDLY POLICIES"

Elias Sait, 40, is managing director of the Chennai-based ALSA Marine, one of India's leading shrimp exporters. As vice-president of the Seafood Exporters' Association of India, he is one of the industry's spokesmen. Sait talked to Bay of Bengal News *recently about shrimp aquaculture, export of shrimp from both capture and culture sources, and how the industry can overcome its present problems.*

Bay of Bengal News: Mr Sait, please tell us about your company's shrimp related operations.

Elias Sait: ALSA Marine is 12 years old, part of the ALSA group which has diverse interests. It has shrimp processing factories at Calcutta, Vizag, Madras, Bhubaneswar, Vellore and Cochin, and a shrimp farm in Nellore. Last year we exported about Rs. 600 million worth of shrimp. A subsidiary company of ours engages in trawling, using Australian deep-sea trawlers.

Our Calcutta factory uses cooking plant and value-added equipment. An ultra-modern plant in Vizag is EEC-approved. A new processing plant with cooking facilities is to come up during the next six months in Madras near the Satyanayalam-Nellore highway.



Shrimps are weighed after grading

Like the rest of the industry, we went through bad times during the past 2-3 years. The company is now undergoing revival and restructuring. It's a pioneer in value addition.

BBN: You have been an eye-witness to the industry's ups and downs. Could you describe them?

Sait: Traditional aquaculture has been practised in West Bengal for 30-40 years. During the second half of the 1980s, commercial aquaculture made its presence felt in Andhra Pradesh (AP) and Tamil Nadu, when a number of farms of size 800 to 1,000 acres came up.

Between 1989 and 1997, the industry's foreign exchange earnings went up from Rs. 800 crore to Rs. 4,600 crores. The main contributor to the increase was aquaculture (Rs. 20,000 million).

During the early 1990s, most investment went into intensive and semi-intensive aquaculture. These firms have suffered badly through recent developments. Most corporate farms in Vijayawada have more or less closed down. Some others have gone into extensive aquaculture.

Some big shrimp farmers are leasing out operations to small farmers. The diseases that erupted during 1994-95 have now been controlled. Stocking density has been reduced, there is better water management, better farming methods are practised. A lot of acreage has been added. There is still a lot of potential for aquaculture. Only 10% of coastal wetlands have been exploited. If we tap all of our wetlands, we would be able to generate lots of jobs, raise incomes and create wealth.

Bhimavaram (AP) is an example. Its economy has flourished on account of aquaculture. But environmentalists are up in arms. They claim that aquaculture has polluted waters, created groundwater scarcity, converted agricultural land to shrimp farming. I must point out that these allegations are backed only by bias, not evidence.

It's less than 5% of shrimp farms in the area that have caused problems. Unfortunately, there was no regulation by the government. Now the government is coming out with an aquaculture policy to ensure proper treatment of pond water etc. As a matter of fact, water going out of shrimp farms is not polluted. But the industry is examining the question with an open mind — it wants to pursue practices that are eco-friendly and soil-friendly.

Once the government's new aquaculture policy becomes law, activities will get a fillip. India has one of the biggest coastlines in the world. It could be one of the biggest exporters of shrimp. A small country like Thailand does better than India on the shrimp export front, though it has far less land than India.

The so-called aquaculture boom has been identified with corporate activity, because of the high-profile investment made by a few companies. When these companies started doing badly, people thought the entire industry was doomed. But aquaculture did very well last year, when a number of small firms took to extensive aquaculture.

BBN: Earlier, you described your company as a pioneer in value addition. Can you elaborate?

Sait: India's export market has been dominated by Japan (60% by way of value, 25% by way of quantity). But Japan treats fish as a commodity. Indian industry should move toward value-addition — toward producing cooked ready-to-consume products in convenient packs to be placed with supermarkets and retail stores, for

Women busy sorting shrimp at a processing plant in Chennai, India.

immediate use by foreign households and restaurants. These would command a higher value than raw fish and shrimp which provide only slight profit margins. The cooked shrimp has absolutely no bacteria.

When we cater to households and housewives, the packing strategy has to be different. A housewife may not be able to use a 2-kilo block of frozen shrimp. In the IQF (individually quick-frozen) mode, each fish is frozen separately, it's convenient for her to buy and use. A housewife can buy a 500-gram pack, a 1-lb pack, or a 1-kilo pack.

Progress toward value-addition would mean depending less and less on Japanese markets, unless Japanese buyers themselves shift focus — and start buying from final sellers like supermarkets and retail stores, instead of from trading companies. We must sell more to the US and Europe, where they buy cooked shrimp, or raw cuttlefish, squid and shrimp. In ALSA Marine's business, Japan accounts for only 20%, US and Europe account for 80%. Japan is the biggest consumer of new products. Special infrastructure is not necessary for exporting bulk-frozen products to Japan. The Japanese do the reprocessing and value addition themselves. But we are trying to move away from commodity markets by improving the infrastructure. We get better value from US and Europe.

Our company is presently restructuring operations. To utilize our facilities better, we do processing and export of shrimp for other companies.

BBN: Is cultured shrimp regarded as superior to captured shrimp for the purpose of export?

Sait: The cultured variety is fresher than the captured, it's better from that standpoint. So far as nutrition value goes, there's not much difference between the two. Some people may prefer shrimp caught naturally in the sea, to shrimp reared on the land. An artificially created environment cannot be better than the natural sea environment. I personally prefer sea-caught shrimp to cultured shrimp - even though there may be no difference in taste.

BBN: How do you see the future?

Sait: I am an optimist. The future is very bright if the shrimp processing industry grows on the right lines, and if shrimp culture overcomes its present problems. This will be possible if government policies provide the right encouragement for aquaculture — through import to enable export, value addition, upgrading of facilities and infrastructure, and finance to make restructuring of firms possible. Exports could touch Rs. 120,000 million in five years.

The Seafood Exporters' Association plays an important part in the process of growth. It represents the needs of the industry at various levels, including the Ministry of Food Processing, institutions like banks, and foreign importers.

The industry needs discipline. Maybe a code of conduct is needed. Foreign buyers sometimes complain about quality. They should know that our association stands for quality and fair practices, and that we mean business.

STREET PLAYS TO PROMOTE CODE OF CONDUCT FOR FISHERIES

The Code of Conduct for Responsible Fisheries — which the Government of India, along with other governments, has signed — is to be promoted in Tamil Nadu through street plays.

The BOBP and the Department of Fisheries, Tamil Nadu, agreed that the Code should be promoted vigorously among fisherfolk so that they are aware of the Code and observe it in practice. A Tamil translation of the Code will soon be brought out and distributed widely among fisherfolk. Locally relevant street plays that highlight the value of the Code will also be organized among fisherfolk communities.

'Nenjil Natham', a Nagercoil theatre troupe, is to put up the plays, under the supervision of Fr Joseph Justus. In October 1998, BOBP's Rene Verduijn (Resource Economist - Associate Professional Officer) travelled to Nagercoil to assist in preparatory effort. It was emphasized that the Code of Conduct should be put into a local context. A framework for the street play was agreed on. A one-month training course was held for 20 youngsters from local fishing communities at the communication centre of the Bishop's House in Nagercoil. Skits, dances and songs were to be developed and refined during the course.

The next issue of *Bay of Bengal News* will report on the first performance of the play, staged on 21 November, 1998, on the occasion of the multi-stakeholder meeting in Nagercoil, to discuss fisheries management and the well-being of coastal fishing communities in Kanniyakumari district.

The photographs on this page are rehearsal shots.

BAY OF BENGAL NEWS

Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional multi-agency fisheries programme which covers seven countries around the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The Programme plays a catalytic and consultative role: it develops, demonstrates and promotes new methodologies, techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in the member countries. The BOBP is sponsored by the governments of Denmark and Japan, and by member governments in the Bay of Bengal region. The main executing agency is the FAO (Food and Agriculture Organization of the United Nations.)

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BAY OF BENGAL NEWS

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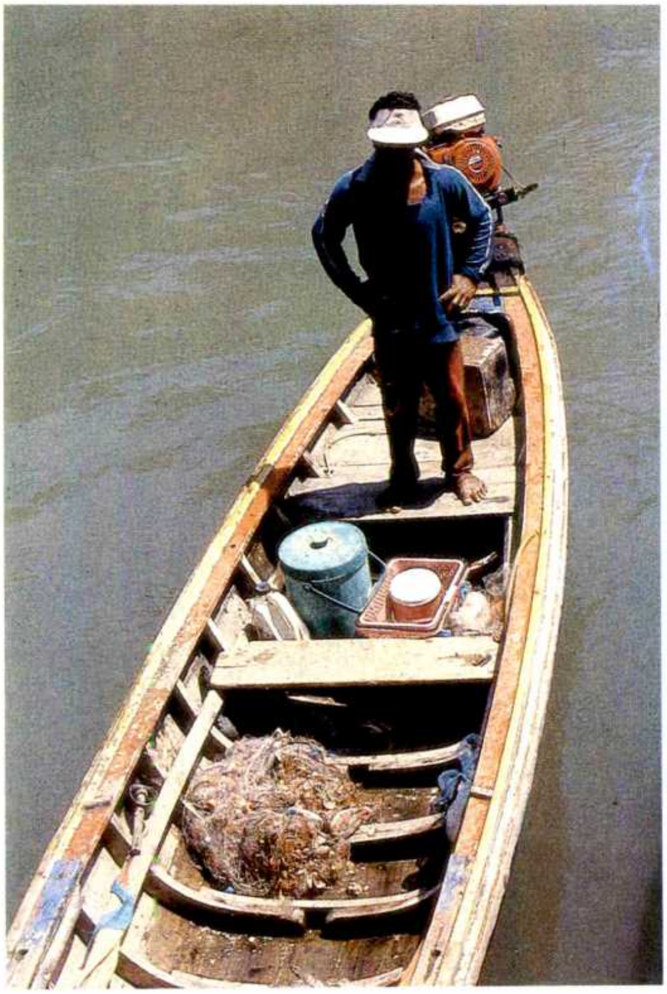
Meetings at Phuket, Chennai and Alor Setar signal new directions for the future

It was an eventful October and November, 1999! The BOBP organised three major regional consultations – in Phuket, Thailand; Chennai, India; and Alor Setar, Malaysia. The three meetings led to three major documents – the Phuket Resolution, the Chennai Declaration and the Alor Setar Declaration.

What happened at the three meetings, what was decided, and what these mean for the future, are briefly reported on the pages that follow, along with the texts of the Phuket Resolution, the Chennai Declaration and the Alor Setar Declaration.

CALCUTTA UNIVERSITY CENTRAL LIBRARY

24th Meeting of BOBP's Advisory Committee, Phuket, Thailand, 13-16 October, 1999.



It was a significant Advisory Committee meeting, being the last under the auspices of an externally-funded BOBP. There were 28 participants and observers from member-countries, NACA, SEAFDEC and BOBP.

- The Committee appreciated the findings of the two-member Mission that documented the BOBP's lessons and outputs.
- The Indian delegation announced that the Government of India agreed in principle, subject to conditions, to the "Block B" activity supported by the World Bank Global Environment Facility or GEF and SIDA – "Sustainable Management of the Bay of Bengal Large Marine Ecosystem." The Committee reaffirmed its support for the GEF-supported effort. It emphasised that the activity will be a logical evolution of BOBP's efforts into the next millennium.
- The Committee listed important problems and issues confronting fisheries development and management in the Bay of Bengal region.
- Member-countries strongly endorsed the need to either continue the BOBP or evolve a new regional mechanism which has the ability to address critical and important issues and concerns relating to fisheries development and management. They recommended that the "exact nature, mandate, constitution and cost-sharing of such a regional mechanism be evolved through consultation among representatives of member-countries, with support from the FAO.
- Since the process to evolve a regional mechanism would take time, the Committee requested the FAO to extendthe third phase of BOBP to utilise funds that remained, to complete ongoing activities, provide a bridging function during the intermediate period and assist membercountries in the process of evolving a new regional mechanism.
- The Programme's library, negative/slide/videotape collection, equipment and vehicles will be handed over to the GEF/SIDA-supported activity.
- The meeting adopted the Phuket Resolution (below).

The Phuket Resolution

Conscious of the importance of fisheries and aquatic resources as an essential sector of development of the nations surrounding the Bay of Bengal and the unique and relatively high dependence of millions of fishers and coastal peoples on the ocean and coastal environment for their food and livelihood security;

Realizing that the fisheries sectors of the countries around the Bay of Bengal have to in the future

1) increase or at least stabilize fisheries production to ensure food and livelihood security for a large number of people,
2) ensure quality fish and fish products in order not to jeopardise trade, which earns valuable foreign exchange,
3) protect themselves from non-trade tariff barriers on fisheries,
4) fulfil requirements of agreed-to Conventions and Codes, and
5) better manage their fisheries and conserve their aquatic environments to provide sustainability;

Recognising that, while fisheries is primarily a national concern driven by a country's needs, there are a large number of issues in fisheries that can be more appropriately and efficiently addressed in a regional context through collective action;

Recognising that the Bay of Bengal Programme of the FAO of UN has provided valuable and noteworthy services to the countries in the Bay of Bengal region in enabling and facilitating the development and management of small-scale fisheries over the last 20 years and the fact that the project is coming to an end in December 1999;

Realizing that there is a need for technical and management advisory services in the areas of fisheries development and management, conservation of aquatic resources, quality assurance of fish and fish products, fair and free trade of fish, fish marketing development, human resources development and building the capacity of national fishery agencies and the promotion and success of such services can be facilitated through regional co-operation;

Considering that the said co-operation can best be achieved through the establishment of an inter-governmental organisation (IGO) in the Bay of Bengal region carrying out its activities in collaboration with countries, organisations and commissions that may be able to provide financial and technical support;

We, the Representatives of the Fishery Agencies of the Governments of Bangladesh, India, Indonesia, Malaysia, the Maldives, Sri Lanka and Thailand, having met in Phuket, Thailand, 13-16 October 1999 for the 24th Meeting of the Advisory Committee of the Bay of Bengal Programme of the FAO of UN, now therefore:

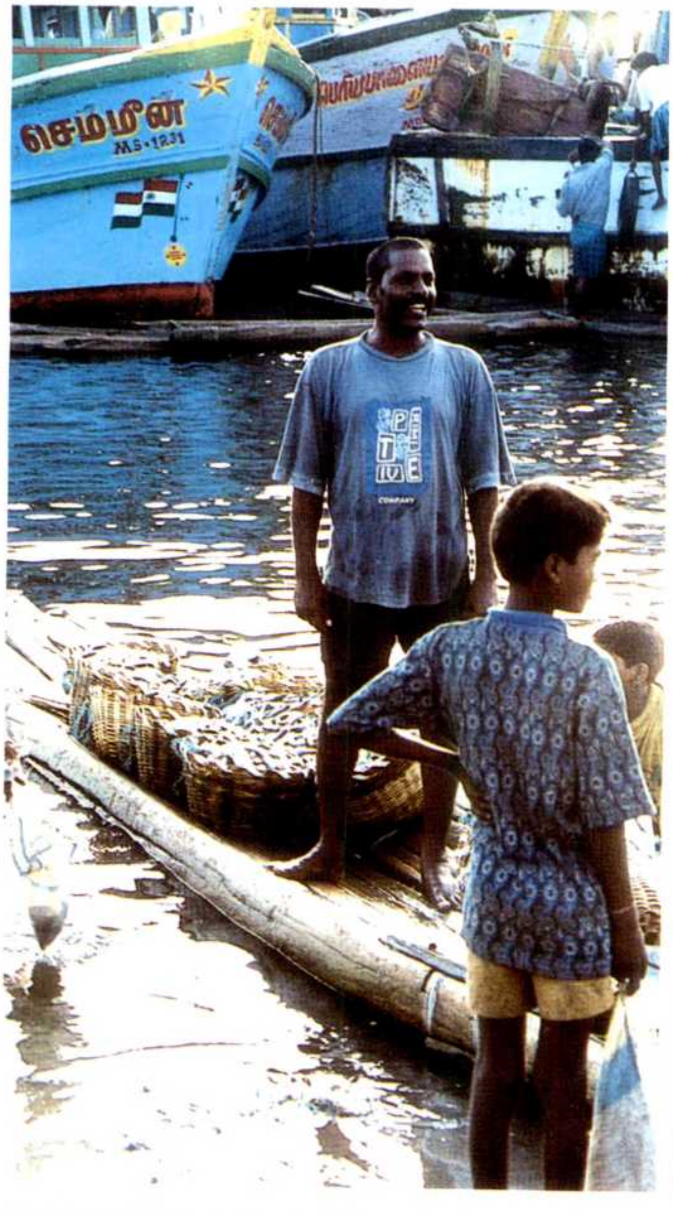
Resolve to come together to consider the establishment of an Intergovernmental Organization for Technical and Management Advisory Services for Fisheries Development and Management in the Bay of Bengal Region.

Request the Food and Agriculture Organisation of the UN for advisory and financial support in the formulation and establishment of such an intergovernmental organization.

Suggest that senior representatives of the fishery agencies of the member-countries of the Bay of Bengal Programme of the FAO of UN meet at their earliest convenience to design and develop the constitution and by-laws of the proposed intergovernmental organisation, specifying its mandate, its management and staffing, its fund requirements, and evolve mechanisms and guidelines for cost-sharing.

Adopted in Phuket, Saturday the 16th day of October 1999.

Regional Expert Consultation on Cleaner Fishery Harbours and Seafood Quality Assurance, Chennai – 25-28 October, 1999



The BOBP has been promoting Cleaner Fishery Harbours in the Bay of Bengal region, with support from the IMO (International Maritime Organization). Pilot activities have been conducted in India, Thailand, the Maldives and Sri Lanka. These focused on awareness-building among fishery harbour stakeholders on methods of avoiding and overcoming pollution. Four publications brought out during the process:

- Cleaner Fishery Harbours in the Bay of Bengal, BOBP/WP/82
- Dealing with Fishery Harbour Pollution – the Phuket Experience, BOBP/WP/93
- Guidelines for Cleaner Fishery Harbours, BOBP/MAG/17
- Fishery Harbour Manual on the Prevention of Pollution, BOBP/MAG/22

Member-countries of BOBP continue to express keen interest in efforts to upgrade or rehabilitate fishing harbours and fish landing sites, and design new harbours. They strongly endorsed the need for a technical consultation which would build awareness, expose the participants to state-of-the-art technologies and facilitate exchange of know-how and expertise. The consultation was held in Chennai, India from 4 to 7 October, 1999. It brought together fishery harbour managers and administrators, professionals in seafood quality assurance and harbour design from the seven BOBP member-countries. Two visiting experts served as facilitators – Mr J A Scortino, ports consultant of FAO, Rome, and Dr S. Subashinghe of INFOFISH. Participants (31 in all, including consultants and BOBP staff) made a field trip to the Chennai fishing harbour and viewed an exhibition of photographs of the harbour.

The meeting is reported in some detail in the article on pages 21-22. The meeting adopted the Chennai Declaration (reproduced on the following page). The report of the consultation is under preparation.

The Chennai Declaration

Conscious that the countries in South and Southeast Asia contribute more than half the world's marine fish trade, which is worth several billion US dollars;

Realising the importance of fisheries as an essential sector of the development of nations in the region and *underlining* the high dependence of several million fishers and coastal peoples on fisheries for their food and livelihood security;

Recognising the increasing global concern about seafood quality, which has resulted in the imposition of quality standards by some countries;

Concerned that the inability to meet quality standards may result in loss of trade and earnings and jeopardize the livelihood and food security of millions of fishers and coastal peoples;

Realising that fishery harbours and landing sites are a vital link in the chain of events from harvesting to consumption and the interface between harvesting and marketing of fish;

Concerned that many fishery harbours and landing sites in the region have been found to be wanting in some aspects of management, quality, design and provision of facilities and services and *realizing* that there already have been negative repercussions to the situation;

Reaffirming the Code of Conduct for Responsible Fisheries and, in particular, its Sixth Annexure, which clearly gives direction to the management of fishery harbours and landing sites;

Emphasising the immediate and urgent need for rehabilitation of fishery harbours and landing sites and giving direction to the design and development of new fishery harbours and landing sites to enable installations which are well managed, efficient, economically viable, address the needs of users and meet quality and environmental standards;

Realising that the understanding, support and commitment of people's representatives and policy-makers is vitally necessary to enable and facilitate the efforts of fishery harbour and fishery agencies;

We, the Representatives of Fishery Harbours and Fishery Agencies of the Governments of Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand, having participated in the BOBP-FAO/IMO/GOI Regional Expert Consultation on Cleaner Fishery Harbours and Seafood Quality Assurance held in Chennai, India, from 25 to 28 October 1999, now therefore:

1. Emphasize the need for awareness-building amongst consumers, users and other stakeholders on the need for, the benefits and methods of achieving cleaner fishery harbours and landing sites, in order to assure the quality of seafood.
2. *Encourage* the participation of all stakeholders in the formulation, siting, planning, development, management and maintenance of fishery harbours and landing sites.
3. *Recommend* that fishery harbours and landing sites should be located and designed keeping in mind fisheries resources availability and market needs, and have facilities and infrastructure, including laboratory facilities, where necessary, means to ensure safety at sea of the users and natural disaster mitigation facilities, to enable total quality management.
4. *Recommend* that improved fisheries resources information and market intelligence be made available on a continuing basis to facilitate better decision-making regarding fishery harbours and landing sites and in order to ensure their long-term sustainability.
5. *Recommend* the evolution of mechanisms to promote inter-departmental co-operation and coordination for comprehensive and integrated management of fishery harbours and landing sites and to better conserve and protect the environment.
6. *Propose* formulation and rigorous enforcement of rules and regulations, including speedy removal of encroachments, adequate staffing and financial support, to promote and ensure compliance.
7. *Recommend* that fishery harbour and landing site managers should be adequately qualified and trained, especially in seafood quality assurance, handling and processing and general management and that managers be empowered adequately to take decisions, both financial and otherwise, to improve the management of fishery harbours and landing sites.
8. *Suggest* that governments make available funds for rehabilitation and maintenance of fishery harbours and landing sites using among other sources a larger proportion of cess and duties on exports of seafood.
9. *Recommend* the charging of rational tariffs for services provided by fishery harbours and landing sites and incorporation of effective mechanisms for collection in order to generate revenue, which should be used in the management and maintenance of fishery harbours and landing sites.
10. *Suggest* a balanced approach to privatisation of fishery harbours and landing sites (if necessary through the provision of incentives) to reduce the burden on governments and to improve efficiency and quality, without compromising the need to address the needs and concerns of poor fishers and stakeholders.
11. *Strongly recommend* the development of one model fishery harbour and one fish-landing site in each country to act as a working demonstration unit, assist in evaluation of methods/approaches/technologies and be used in the training of managers.
12. *Strongly recommend* that countries seek the support of the Food and Agriculture Organization of the UN and other countries for development of model fishery harbours and landing sites through TCP and TCDC arrangements.

Adopted on Thursday, the 28th of October, 1999,
in Chennai, India.

Regional Symposium on Marine Protected Areas (MPAs) and Their Management, Alor Setar, Kedah, Malaysia, 1-4 November, 1999

Some 40 delegates from member-countries, the Philippines, BOBP and Australia took part in this symposium, which was organised by the Department of Fisheries, Malaysia, with support from the BOBP, and held in Alor Setar, Kedah, 1-4 November, 1999. The symposium objectives were to discuss the need for conservation of fish and aquatic resources and their habitats; provide an overview of the scientific, technical and institutional context behind the use of MPAs for fisheries and aquatic resources management; explore the management strategy of MPAs, evaluate the social and economic prospects of MPAs for developing countries, evaluate and adapt to developing countries any available guidelines on establishing MPAs.

Resource persons were drawn from Environment Australia and the Australian Institute of Marine Sciences. The Deputy Director-General of Fisheries, Malaysia, inaugurated the symposium. He called for pro-active management of the marine environment and its biodiversity. He emphasised the efforts of the Department of Fisheries to create and build awareness on marine conservation, since the establishment of the Pulau Payar Marine Park in 1987. He said that the National Policy on Marine Biodiversity had been launched on 16 April 1998 to help the country implement strategies, action plans and programmes for the conservation and sustainable utilization of its resources.

Dr Bernadette O'Neil of Environment Australia delivered the keynote address on "The need for marine protected areas and marine parks: networks and transboundary management approaches for success." She also presented a paper on "Planning for performance assessment of marine protected areas and marine parks". Mr Alistair Cheal, Coordinator of Reef Fish Monitoring with the Australian Institute of Marine Sciences, presented a paper on "System of Monitoring of Marine Protected Areas and Marine Parks: Suggested Model and Experiences".

Four symposium sessions were devoted to "Learnings and lessons," based mainly on experiences from Malaysia, the Philippines and Australia. A field trip was made to the Pulau Payar Marine Park.

The symposium passed the Alor Setar Declaration, reproduced below.

The Alor Setar Declaration

Conscious of the importance of fisheries and aquatic resources as an essential sector of development of nations surrounding the Bay of Bengal and the unique and relatively high dependence of millions of fishers and coastal peoples on the ocean and coastal environment for their food and livelihood security;

Recognising that marine ecosystems and, in particular coastal aquatic ecosystems such as coral reefs, seagrass beds, mangroves, estuaries and lagoons not only harbour a wealth of biological resources of immense present and future benefit to humankind but are also the genetic banks of the oceans, which in addition provide buffers to coasts and protect them from storm surges, damage and erosion;

Concerned that coastal ecosystems are under increasing threat of degradation of habitats and depletion of resources resulting from unchecked and uncontrolled resources extraction, pollution from land and sea, construction, impacts of tourism and upstream activities such as agriculture and forestry;

Realising that degradation of habitats and depletion of resources in coastal ecosystems would have detrimental effects on fisheries and threaten biodiversity, which in turn would jeopardise the food and livelihood security of millions of fishers and coastal peoples;

Recognising the immediate and urgent need for conservation and management of coastal habitats and resources in a precautionary mode;

Reaffirming the Code of Conduct for Responsible Fisheries and the Convention on Biological Diversity;

Realising that one important means of conserving and better managing coastal aquatic resources is to declare certain whole aquatic ecosystems as Marine Protected Areas (MPAs);

Recognising from experience that Marine Protected Areas, which set aside clearly demarcated areas of land, water and marine terrain and ensure that they are not subjected to further resource extraction and ecosystem damage, enable the ecosystem to recover, recuperate and rebuild, often acting as a source of recruitment for neighbouring ecosystems;

Emphasising the immediate and urgent need for establishment of a series of large and small, preferably inter-connected Marine Protected Areas in the region to conserve biodiversity and better manage critical aquatic resources;

Realising that the understanding, support and commitment of stakeholders, people's representatives and policy-makers is vitally necessary to enable and facilitate the establishment and management of Marine Protected Areas;

We, the Representatives of Fishery Agencies of the Governments of Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand, having participated in the Malaysia/BOBP-FAO Regional Symposium on Marine Protected Areas and Their Management in Alor Setar, Malaysia, 01-04 November 1999, now therefore:

1. *Emphasise* the need for awareness-building amongst the general public, users and all stakeholders on the need for, the benefits and methods of conserving coastal and marine ecosystems and managing aquatic habitats and resources through the establishment and sustained management of Marine Protected Areas.
2. *Recommend* the establishment and sustained management of Marine Protected Areas in the region as an important tool for environmental conservation and fisheries management.
3. *Encourage* the participation of all stakeholders in the formulation, siting, planning, establishment and management of Marine Protected Areas to ensure their sustainability.
4. *Promote* the need for long-term sustainability of Marine Protected Areas, and careful balancing of such efforts with other coastal activities such as fisheries, ecotourism, industrial activities and construction of infrastructure.
5. *Recommend* the need for integrated, multi-disciplinary planning and implementation of integrated coastal zone management and development efforts to ensure their long-term sustainability.
6. *Ensure* the use of Ecologically Sustainable Management (ESM) as guiding principles for integrated coastal zone management and development to ensure that establishment of Marine Protected Areas does not in any way reduce focus on the need to conserve and sustain other ecosystems.
7. *Recommend* the evolution of mechanisms to promote inter-agency co-operation and coordination for comprehensive and integrated management of Marine Protected Areas in the context of integrated coastal zone management and development.
8. *Suggest* the need for systematic and integrated planning processes to keep in mind the inter-connected nature of coastal and other ecosystems.
9. *Recommend* the evolution of a legal framework to facilitate and enable the establishment, regulation and management of Marine Protected Areas.
10. *Propose* the formulation and rigorous enforcement of rules and regulations with adequate staffing and financial support to promote and ensure compliance.
11. *Recommend* the evolution of legal and administrative mechanisms to adequately regulate and control impacts on Marine Protected Areas from upstream and adjacent activities.
12. *Suggest* that governments make available funds for the establishment and long-term management of Marine Protected Areas using among other sources a larger proportion of cess and duties on economic activities such as fisheries and ecotourism, which benefit directly from Marine Protected Areas.
13. *Recommend* the charging of rational tariffs for eco-friendly activities and use of Marine Protected Areas, which should be used for the maintenance and management of Marine Protected Areas.
14. *Suggest* the need to consider cost-sharing amongst agencies to finance the establishment of Marine Protected Areas, including trust funds, which may be needed to help those whose livelihoods are affected by the setting up of Marine Protected Areas.
15. *Recommend* that managers and technical staff of Marine Protected Areas should be adequately qualified and trained and be empowered adequately to take decisions, both financial and otherwise, to improve the management of Marine Protected Areas.
16. *Suggest* the promotion of scientific research and long-term monitoring to ensure the sustainability of Marine Protected Areas.
17. *Strongly recommend* the sharing of knowledge, expertise and experience amongst Marine Protected Areas, nationally and within the Bay of Bengal region, in the context of conserving and better managing the Bay of Bengal Large Marine Ecosystem.

Adopted in Alor Setar, Malaysia
on Thursday, the 4th day of November 1999.

STOP PRESS!
BOBP Extended for Six Months

On the basis of the Phuket Resolution adopted by the 24th Advisory Committee of the BOBP, which clearly expressed the views of Member-Governments, the Bay of Bengal Programme has been extended till June 2000, using savings from the Programme. The BOBP's mailing and e-mail addresses, as well as the telephone and fax numbers, remain the same till June 2000.

BOBP At The Crossroads

by Kee-Chai CHONG

After 20 years, many fisheries stakeholders are calling for a continuation of what BOBP is best at doing – pooling and leveraging limited resources to help the poor; acting as a catalyst and facilitator; bringing new ideas to Departments of Fisheries; communicating awareness on fisheries management to the departments.

Today, BOBP is at the critical crossroads. For the last 20 years (1979-1999), and in particular during the last five (1995-1999), the FAO has sought to concentrate certain resources through the BOBP for problem-solving in the Bay of Bengal region. It has had the strong financial support, goodwill and commitment of our external donors and member-countries in the process. The donor community comprises Sweden, Denmark, Japan, AGFUND, IMO, UNDP and UK (ODA/DFID). The member-countries are Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand.

BOBP chose to focus throughout the programme duration on small-scale fisheries and its communities of stakeholders as its target clientele. (See pages 25-27). It faithfully stuck to this founding rationale and followed a logical phase-by-phase progression of intervention in the fisheries sector and coastal environment. While the first and second phases had an R&D orientation, the third is largely management-oriented.

In addition to these three core programme thrusts, BOBP is also fortunate to have received donor support on post-harvest technology for fisheries and on cleaner fisheries harbour management and seafood quality assurance. The groundwork to establish BOBP way back in the late 1970s with the support and active participation of both donor and member-countries resulted in a well-conceived, systematic and well-integrated programme.

BOBP has both been responsive and pro-active in its work, frequently meeting requests from its member-countries, under advice from its Advisory Committee. From the beginning, the Advisory Committee has been represented by senior government officials from member and donor countries, as well as by FAO, interested observer countries, and international/regional institutions active in fisheries and the coastal environment.

Cost-Effectiveness

As per the Project Document, the Project's staff was meagre: a Programme Coordinator/Senior Fish-

"BOBP chose to focus throughout the programme duration on small-scale fisheries."

eries Management Adviser for five years and a Communication Adviser for three years. Recognising the critical role and contribution of human resources to the success of project implementation, BOBP took steps to overcome its personnel limitations.

For the entire five years of the Third Phase, every effort was made to stretch and leverage allocated funds from donors to do justice to the scope and content of the Third Phase work plan. Some examples.

1. Resource Persons for BOBP workshops, consultancies and field activities were provided to BOBP at nominal cost to the Programme.
2. Workshop and other operational costs were shared with interested and willing sponsors, mainly to defray the direct workshop expenses of participants. Smart networking is essential to do more with less.

Emerging Trends and Benefits of Management

Member-countries are beginning to shift steadily from a development mode to a management mode. Management in many member-countries is no longer piecemeal or *ad hoc*, responding only to outbreaks of conflict or crisis, but is pro-active and precautionary. There is less and less emphasis on the regulatory dimension of management, more and more recognition that management is essential and in the public interest because it entails responsible use of fisheries and aquatic resources.

Along with this shift, there is a positive transformation from the past techno-bureaucratic approach of resource management to a more participatory stakeholder approach to management.

The planned interventions in fisheries and aquatic resources in the region over the past 20 years have resulted in certain tangible and intangible benefits. At the aggregate macro-level, a greater output of fish has been recorded. However, at the micro-disaggregated level, there have been mixed indicators about per capita availability of fish. It seemed that per capita availability of fish was increasing; but recently Bangladesh reported a decreasing trend. One must point out, however, that in Bangladesh, more than 80 % of the fish supply is from inland freshwater sources and only about 20 % from marine sources. While marine fish landings have been increasing, the supply from inland freshwater sources has been declining because of several factors — extensive land remodelling through structures for flood mitigation, drainage and irrigation; excessive fishing pressure from a burgeoning population; and habitat degradation.

It is expected that the Programme's benefits will continue long after the 20-year old BOBP closes down. This is because of the kind of interventions BOBP and member-countries have engaged in over the last 20 years. The benefits accrue to target and non-target beneficiaries in different degrees and time-scales — some benefits are almost immediate, a few others are perceived after some time, still others long after such interventions have been completed. Because of the pains taken by BOBP and member-countries to ensure that their activities mesh with one another, the Programme's work will continue long after external funding for it ceases.

Awareness about the benefits, methods and approaches of improved management of fisheries and aquatic resources is now high and steadily growing. Such awareness at all levels has spurred coastal communities to either seek help to address their problems or initiate action themselves. Steady incremental change is noticeable, especially in the mindset of the people, their values, perceptions and attitudes.

Another concrete result observed is that the mode of operation of government personnel involved in BOBP activities over the years has changed for the better. They are now more confident about carrying out field work; at one time they were anxious and nervous about meeting their constituents face to face.

Review of Performance

In reviewing the Programme's performance over the last five years, it is safe to say that the necessary processes to create, build and arouse awareness about the need for, the benefits, approaches and methods for improved management of coastal fisheries and environment protection, have not only been set in motion but achieved. Simple and direct audio-visual and multi-media awareness campaigns were used, public outreach campaigns were conducted, to reach out to all target groups and stakeholders.

However, the quality of the outputs delivered was not uniform in the seven countries. In most countries, good progress was made toward the objective of sustainable development in coastal communities through an integrated coastal area development and management approach. This is evident from the continuous local community involvement and participation in conservation activities. Economic diversification as another project input to expand or enlarge the sources of income of coastal communities was also successfully implemented — not only through studies but more importantly through local hands-on training. An excellent illustration is eco-tourism as a source of income.

The Programme is happy to report significant spin-offs from BOBP pilot activities in the form of new or additional projects: three new projects in Bangladesh, supported by UNDP, DFID and the Bangladesh Government respectively; one in Indonesia covering four provinces, funded by the Asian Development Bank (ADB); and FAO TCP/SPFS project proposals, one each in Malaysia and Thailand, patterned after BOBP work. The other projects are follow-ups to the Programme's work.

Although infrastructure and social services are outside the ambit of the Third Phase, some countries have integrated BOBP inputs with their ongoing national programmes in capital infrastructures investment. This integrated multi-sectoral approach is clearly preferable to purely management-oriented intervention.

On the containment and regulation of fishing efforts, BOBP member countries have not been as successful, even with the Programme's assistance. Attempts to draw coastal fisherfolk out of fisheries are confronted with the problem of limited job opportunities in rural coastal areas. With alternative jobs or means of other livelihood almost non-existent in coastal areas, it is not fair to ask fisherfolk to leave the fisheries. Replacement and substitution of resource-damaging

"Improved management is essential for maintaining the incomes of small-scale fisherfolk and protecting bio-diversity."

gear with less resource-damaging gear was also attempted to contain and regulate fishing pressure. This was quite successful in Thailand. Lack of funding, however, also constrained greater achievement of this objective. Even so, government awareness about the need to contain and regulate fishing effort is growing. It is accepted as the way forward to manage fisheries sustainably.

BOBP has been successful in its work as catalyst and facilitator. The principles of pooling of resources, cost-sharing, and national execution of activities, have been imaginatively employed to implement Programme activities. To the credit of many member-countries, they responded positively to the innovative mode of project implementation. Besides the agreed annual government cash contribution, a few governments also provided hard cash for joint cost-sharing of activities. For example, the Tamil Nadu Government in India contributed US$ 30,000 for activities in the state. Contributions from governments in Malaysia and Indonesia made a significant difference to the quality of work of joint activities carried out in these two countries.

After 20 years, many fisheries stakeholders are calling for a continuation of what BOBP is best at doing – joining forces with developing countries by pooling and leveraging limited resources to improve the lives of the poor in coastal communities around the Bay of Bengal; acting as a catalyst and facilitator; bringing new ideas to departments of fisheries; communicating awareness of recent advances in fisheries management to the departments. What is permanent and what continues is the goodwill of the stakeholders towards BOBP and FAO.

Certain setbacks have been encountered, but they have been temporary and resolved over time. The receptiveness to BOBP work has been high at all levels of government, NGO or coastal communities, as noted by the Mission on documenting the lessons learned from BOBP's experiences.

During the last five years, the principle of national execution and cost-sharing has been actively pursued. Experiences with national execution and cost-sharing have been valuable to the project personnel concerned. It has built up their confidence about carrying out day-to-day work with limited financial support. These personnel have been able to find ways to overcome financial constraints and develop smart partnerships with their clients. After a few false starts, many joint activities carried out by the project personnel became self-starters. Such success lies at the core of the BOBP's thrust on local capacity-building, institutional strengthening and local capacity utilisation, implemented through nationally-executed and cost-sharing project activities. BOBP is willing to wait until local cost-sharing funds become available.

More effort, however, is required to strengthen the training of trainers at the national level. While those who have participated in BOBP activities have benefited, these trainers need to impart their skills and knowledge widely to colleagues in the Department/ Ministry.

Weaknesses remain over the mobilisation and organisation of fisherfolk for direct consultation. There is still some uneasiness on the question of public hearings that involve fisherfolk, and direct consultation with them. In some countries, fisherfolk leaders are able to mobilise and organise their community effectively. In other countries, this has not been possible. Hands-on community leadership training is a key to such community mobilisation and organisation.

Bay of Bengal Committee (BOBC)

The Committee for the Development and Management of Fisheries in the Bay of Bengal (BOBC), of the Indian Ocean Fishery Commission or IOFC, came into being in December 1981 in Colombo. BOBC is the apex advisory and coordinating body for fisheries development and management in the region. Over the last 20 years, the BOBP has provided valuable inputs into BOBC's deliberations. When BOBC ceased to exist with the termination of the IOFC, APFIC (Asia-Pacific Fisheries Commission) absorbed the BOBC. This move was meant to strengthen and restructure regional fisheries bodies.

What Others Have to Say about BOBP

The following comments are from (a) A report commissioned by SIDA and undertaken by SWEDMAR about the quality of BOBP's output (b) The FAO/Denmark/Japan Mid-Term Evaluation of the BOBP and (c) the 1999 FAO Mission to document the learnings and lessons of BOBP's Third Phase.

- BOBP is probably the best documented long-term fisheries project in the world (Andreasson and Funegard, 1997). According to Andreasson and Funeguard (1997), an average 90% of the pilot projects yielded conclusive results.

- The Third Phase BOBP has been successful in raising the profile of a people-centred consultative approach to the management of fisheries and aquatic resources. Improved management is essential for maintaining the incomes of small-scale fisherfolk and protecting biodiversity (Markie, Hotta and Sen, 1997). Thus the Third Phase BOBP was addressing and meeting an important need of its member-countries, that is, the inclusion of the human dimension in management.

- BOBP has had just about three and a half years to implement these activities, since the first 12 to 18 months of the Third Phase were spent in situation analysis and defining the BOBP's role during the Third Phase. A major lesson from BOBP is therefore that a five-year time-scale will not allow completion of a process as complex as management. A longer time horizon is needed.

- Member-countries were unanimous that a regional approach such as BOBP's is valuable in addressing coastal management issues. Advantages: easy access to specialised advice, active information dissemination, learning from the experiences of other countries. BOBP workshops enable personal contact among officials and experts of different countries. There is also a sense of pride from partnership with an international programme. Member-countries were unanimous that the third phase should be continued in some way, expanded if possible.

- Member-countries have praised highly the advice, inputs and technical support provided by the Programme, but note that the small size and limited financial resources of BOBP limit the assistance the Programme can provide.

- Experience-sharing appears to have been more effective at the international level than the national level.

- A major problem has been the frequent transfer or promotion of officials trained by BOBP — the project loses their services. This has affected the implementation of BOBP-supported activities. The Programme's model of a stakeholder approach is steadily being pursued by member-countries.

- BOBP has had a strong impact on raising awareness about fisheries and coastal management issues. The creation of a core group of fishery officers at senior and middle levels in each country who are committed to improving fisheries management is one of BOBP's major achievements.

- Most countries spoke highly of the information activities, particularly the Newsletter, *Bay of Bengal News,* which was the main channel for information-sharing. Some of the Newsletter's articles had been translated into local languages. The Programme's posters were seen in many of the locations visited by the team. The consensus was that these too were useful in spreading management awareness. National counterparts attached great value to local-language materials whose production was supported by BOBP.

- BOBP's advocacy role was emphasised in a number of countries. Its endorsement of a fisheries management initiative lent it credibility in the eyes of both fisheries stakeholders and government decision-makers and facilitated approval by a central government or an international agency.

- To a greater degree, the success of the Programme's activities in member-countries can be attributed to the spirit of national execution and cost-sharing which instills greater work and financial discipline. It has shown that national execution can and does work.

Closing Remarks

BOBP does not directly manage fisheries. Only member-countries do so. Through various modalities — as a catalyst, facilitator and neutral coordinator – the Programme has been able to promote the processes required to sustainably manage fisheries and aquatic resources in member countries. BOBP's initiatives have focused on bringing together and involving all stakeholders in the management process – those within and without the fisheries. This has been achieved to a large measure in the pilot projects carried out and documented. In the final analysis, only the sustainable production, development and management of fisheries and aquatic resources can help to increase the purchasing power of the poor and thereby help to eradicate poverty and sustain the environment into the future.

Documentation of Learnings: India

by Dipankar Saha

The last issue of Bay of Bengal News *summarised the findings of the recent two-member Mission that documented the learning of the BOBP's Third Phase. The article on these pages summarises the learnings relating to BOBP's activities in India, presented by national consultant.*

Under the Third Phase of BOBP, activities in India were initiated in 1995 in Tamil Nadu (Kanniyakumari and Chennai districts). Andhra Pradesh (East Godavari, West Godavari & Krishna districts), Orissa (Baleswar and Cuttack Districts) and West Bengal (North 24 Parganas, South 24 Parganas & Midnapore Districts).

Following a survey and a workshop organised in co-operation with the Government of India and the State Governments, the Programme decided to focus on coastal fisheries management in Tamil Nadu and Orissa, and on aquaculture management in Andhra Pradesh and West Bengal.

A national consultant was assigned to extract the learnings from the Programme's work in India, in the light of the Programme's objectives. He visited all the four East Coast States during the months of May and June 1999. He met fisherfolk, Government officials at basic and senior levels, NGO representatives, and other stakeholders. His impressions and findings about BOBP work are summarised here.

Findings and Impressions, Tamil Nadu

1. Fisherfolk welcome diverse activities such as the setting up of artificial reefs promoted by BOBP. They would like the Programme to initiate a proposal to the Government to continue practical demonstrations on artificial reefs.
2. The BOBP-supported study on fishing intensity in Kanniyakumari district is considered useful by fisherfolk. The study yielded maps showing which groups fished where. Fisherfolk said the study used participatory tools to identify in detail the problems of coastal fisheries. It helped them comprehend the realities about fishing pressure. It made possible discussion and development of strategies to solve some of the problems highlighted.
3. The series of stakeholder consultations and meetings in Kanniyakumari district has helped ease tensions in relationships between the three groups of boat owners — *kattamurams*, *vallams* and motorised boats. Conflicts among the three have not been eliminated, fisherfolk say, but there is better understanding of one another's viewpoint.
4. Resource mapping in every village through application of Participatory Rural Appraisal (PRA) tools has shown the fisherfolk a quick low-cost method of obtaining information.
5. The fisherfolk want early action by the authorities on infrastructure needs they have identified and prioritised through a BOBP study. They want more frequent and regular contact with the Department of Fisheries (DOF) or BOBP staff or both.
6. Grassroots-level Government staff appreciate the PRA method they have learned. It has strengthened their knowledge, and their confidence about collecting information on coastal problems.
7. Junior Government staff say that implementing the stakeholders

approach and taking part in stakeholder consultations means heavy work outside office hours for which they are not compensated. A system of financial incentives is necessary to counter hardship and keep up morale.

8. They point out that allocation of funds for these activities is insufficient. They do not have official Government instructions or orders for the responsibilities they have to undertake. This hampers and slows work.

9. Delays in instructions from the headquarters to district offices have hampered implementation of BOBP work, officials say. There is no Government order on the basis of which funds can be spent by fisheries officials. Funds expected from Central Government sources for implementing BOBP-related work have not been forthcoming either. Delays in implementation are therefore inevitable.

10. Mr Hans Raj Verma, Director of Fisheries, says that BOBP work has tremendous techno-economic potential, but the implementation time is too short and unrealistic.

11. NGOs feel that BOBP activities should be implemented through a number of channels. They say the Programme's credibility is at stake if it relies heavily on Government to implement activities. BOBP should insist on policy changes on the basis of the surveys or studies it organises.

12. NGOs believe that BOBP's information materials would generate more impact if they were aimed at fisherfolk rather than officials, and if they were produced in the vernacular.

13. Former Government officials, some of whom facilitate project work, suggest the setting up of training centres for fisherfolk relating to the Code of Conduct for Responsible Fisheries, marketing operations, etc.

Findings and Impressions, Andhra Pradesh

1. Fisherfolk believe that their main problems are the Supreme Court's order which imposes severe constraints on prawn culture, and the disease outbreaks in shrimp. They want concerted effort by the BOBP or the Government to rescue them.

2. The high work-poor payment syndrome has created unhappiness in Andhra Pradesh just as it has done in Tamil Nadu. The allowances that officials are paid for work relating to stakeholder analysis, etc. are considered insufficient.

3. Junior officials believe that BOBP-initiated training programmes concerning participatory analysis, stakeholder analysis and farming systems research have strengthened their knowledge base.

4. Junior government staff who took part in stakeholder consultations say that they together identified three solutions to the present problems with prawn culture – forming clusters of farmers to modify and improve the water drainage system; culture of alternative species (crabs for example) and of different prawn species (such as *Penaeus indicus*); and waste treatment to reduce environmental hazards and improve management. The staff had outlined a project proposal based on these suggestions. They would like early action on a project incorporating these steps.

5. The BOBP had provided a water-quality testing kit for experimental purposes to small-scale prawn culturists in Mattapalam near Kakinada (East Godavari district). Senior Government officials say that at least three more kits should have been made available for experimental purposes – one more in East Godavari, two in West Godavari and Krishna districts.

6. Junior Government officials say that NGOs are complicating the problems of prawn culture by dabbling in technical matters though they lack technical expertise. The NGOs should stick to social issues, which is where their strength lies.

7. Senior Government staff say the training on PRA and stakeholder analysis given to junior staff has been very useful. It has brought them closer to the target group and led to better understanding of the technical and social problems of target groups. The senior staff now get stronger inputs and assistance from the junior staff.

8. The training imparted has not merely facilitated BOBP-related work. It has also eased implementation of other fisheries projects because of the closer interaction and rapport established between the Department of Fisheries and fisherfolk.

9. On the basis of the exercises in stakeholder consultations and analysis, and farming systems analysis, the Department of Fisheries has published useful leaflets in Telegu on (i) Package of practices on shrimp farming (ii) Identification of quality seeds and (iii) Identification of diseases and their prevention.

   Says Mr O. Bhavanishankar, Additional Director: "Earlier, such leaflets were written in an office and did not reflect happenings on the ground. But these leaflets are based on field trips and inquiries and incorporate feedback from the field ... Prawn farmers are happy with them."

10. Most Government staff trained by BOBP have been retained at their work stations and not transferred. This has facilitated smooth implementation.

11. There has been a communication problem about matching funds from the Centre for State Government activities on prawn culture. The Centre says the DOF should tap Integrated Rural Development Programme (IRDP) and Brackish-water Fisheries Development Agency (BFDA) funds for the purpose. However, at the state level, the absence of a GO specifically authorising BFDA to divert funds meant for brackishwater fisheries to stakeholder consultations is a handicap. In future, a GO from the Secretary of Fisheries authorising such expenditures should be organised to facilitate action.

12. Following the participatory exercises on farming systems analysis, the Department of Fisheries is trying to develop and demonstrate better management practices for shrimp farmers.

13. The DOF seeks to improve existing shrimp culture operations by measures such as low stocking density, supplementary pelletted feed and biotic agents to improve bottom soil. The DOF believes that such measures will reduce to some extent the problem of disease outbreaks in shrimp.

14. Senior government officials feel strongly that BOBP should continue for a few more years and promote solutions to shrimp culture problems based on experiences from elsewhere. They would like to see a new phase of BOBP from 2000A.D.

Findings and Impressions, Orissa

1. As in other states, senior officials in Orissa are not conversant about the distinction between the earlier phases of BOBP and the present phase. They recall the Programme's work in earlier years – relating to training of extension officers, bank credit for fisherfolk, beachlanding craft, non-formal education for fisherfolk children.

2. They do not know why Baleswar was selected for implementation of BOBP activity instead of Ganjam where the Programme is better known.

3. They do not know why BOBP's work in their State was discontinued during the latter part of the Third Phase.

4. They agree that the BOBP's training programmes strengthened their knowledge, but unfortunately most of the trained officers were transferred to other areas.

6. The Secretary of Fisheries says funds are the main constraint for implementation of coastal fisheries management programmes. The State's budget is limited, so Central funds are needed to carry out coastal fisheries management activities.

Findings and Impressions, West Bengal

1. Junior government officials say that the exercise of stakeholder analysis through PRA has strengthened their knowledge base. They are confident that they will be able to effectively use PRA as a tool to collect data on coastal aquaculture problems. They say that the Trainers Training Programme organised by BOBP has also helped them in their day-to-day work.

2. As in other States, they suggest some financial incentives for staff engaged in work on stakeholder consultations and analysis.

3. They point out that they have undertaken work without proper instructions or guidelines from their superiors and without adequate funds being allotted.

The stakeholder consultations initiated by BOBP have helped ease tensions between owners of kattumarams, vallams *and motorised boats.*

4. A three-tier *Panchayat* system is actively engaged in West Bengal in the implementation of all developmental projects. The DOF should familiarise the *panchayats* with BOBP work and involve them in its implementation.

5. The problem of transfer of officials trained by BOBP has not occurred in West Bengal. Most staff have been retained at their work stations.

6. The State Government has allocated a sum of Rs 5 lakhs for BOBP activities. In the absence of Central funds and proper guidelines, it could not do better.

7. A state-level NGO, the Ramkrishna Ashram Krishi Vigyan Kendra (RAKVK), has played a vital role in maintaining liaison between senior and junior officials and stakeholders of the three districts for better implementation of BOBP's activities. The personnel of the Kendra say that stakeholders analysis, the participatory approach and experiential learning have created great enthusiasm among grassroot-level government staff. Such capacity-building has not only helped them in their day-to-day activities, but also instilled confidence in them about tackling other problems.

8. Coordination between grassroots-level officials and senior officials needs to be strengthened. A full-time departmental officer with a scientific background ought to take up this responsibility on behalf of BOBP and the State Government.

Fisheries Development Commissioner to the Government of India

1. The Fisheries Development Commissioner regards BOBP's Third Phase as a tripartite effort to help introduce better fisheries management practices in the four East Coast States. The effort involves the BOBP, the Government of India and concerned State Governments. Each party plays a specific role: BOBP serves as think tank and resource manager, GOI as facilitator for the activities in each State in identified areas, the State

India's Fisheries Development Commissioner is unequivocal about the need for BOBP to continue its activities in India as an inter-governmental organisation. So that it plays its part in the better management of coastal communities.

Governments as agencies for programme implementation for the betterment of their states' coastal resources and fisherfolk.

2. The Fisheries Development Commissioner agrees that the overall achievements during this phase of implementation are quite satisfactory. However, considering the area of the four states – larger than some small countries – the effect is not immediately perceived.

3. The Fisheries Development Commissioner does not regard the overlap between the BOBP's different phases in the minds of some State fisheries officials as a matter for worry. Sometimes, technical programmes from one phase carry over to the next phase. So it is difficult to draw a line between one phase and another.

4. The country's vast size, and the diversity in culture and entrepreneurship levels has to be borne in mind while assessing the strengths and weaknesses of any national project.

5. He is unequivocal about the need for BOBP to continue its activities in India as an inter-governmental organisation, so that it plays its part in the better management of coastal communities.

6. Considering the BOBP's limited manpower, it could engage national consultants in each state for effective management of the remainder of the Third Phase and ensure good results.

Learnings, India

1. A full-time officer may be necessary at BOBP to pursue and coordinate the subject of stakeholder consultations and analysis in the four East Coast States.

2. A manual on stakeholder analysis would be essential to help officials at all levels. It is understood that BOBP will publish such a manual shortly.

3. A mechanism should be worked out for smooth State-level implementation of the activities initiated by an international organisation such as BOBP. Area-specific plans should be drawn up with the full approval of the authorities concerned. These ought to enable prompt implementation of activities and timely disbursement of funds wherever necessary.

4. States should get clear instructions and guidelines from the Centre on how States can tap and access funds to implement the activities of an organisation such as BOBP.

5. In some States (like West Bengal), district authorities like the *Panchayats* should be engaged by the DOF for successful implementation of BOBP project activities, since they have both the manpower and the funds.

6. Participatory Rural Appraisal (PRA) methods should be promoted and popularised for quick data collection.

7. Considering the Programme's achievements in strengthening the knowledge base of officials, extension of useful and viable technologies to end-users, and developing the fisheries data base at the State level, donors should consider a new phase of the BOBP to further strengthen coastal fisheries management in India and other countries around the Bay of Bengal.

Documentation of Learnings, Maldives

by Hassan Maniku

Introduction

To fully understand the linkages and experiences Maldives has had with the BOBP, it is important to briefly reflect on the Programme's past history.

Even though Maldives is the smallest partner in the Programme, it has played a major role in the evolution of the Programme, specially its third phase. Maldives officially joined the Programme only in 1988, during its second phase, but it has been receiving assistance from the BOBP since 1983.

The second phase of the BOBP focussed on developing extension services and aquaculture and on understanding the fishery resources. Maldives benefited extensively from this Phase in understanding its emerging reef fish fishery.

Highlights of Second Phase Activities:

1. Establishment of an Extension Unit within the Ministry of Fisheries and Agriculture, which at present is the Operations Section of the Ministry of Fisheries, Agriculture and Marine Resources.
2. Short-term training for a number of staff from the Extension Unit. Through BOBP collaboration, Maldives has been able to receive training annually from the SEAFDEC Training Center in Thailand. This is one of the activities that was sustained throughout the Third Phase of the BOBP as well.
3. Introduction of appropriate technologies, such as boat hauling devices.
4. Development of teaching materials for primary and secondary schools on resources utilisation and understanding. Development of a colouring book about the Reefs of the Maldives.
5. Preparation of a Handbook on Fisheries Data Collection, targeted at reef resources. This draft has been prepared and tested with the communities of Vaavu, Meemu, Faafu and Dhaalu as well. The Handbook is ready for introduction.
6. Understanding the Bio-Economics of Fish Aggregating Devices. A study was conducted to understand its impact.
7. A number of resources assessment surveys were conducted – on tunas, reef fish resources, giant clam fishery, sea cucumber fishery, and shark fishery. The findings and recommendations have been accepted by the government and used to develop management regulations.
8. The second phase of the BOBP culminated in the development of the Integrated Reef Resources Management (IRRM) Programme as a National Research Programme to assist the government in developing management options for the reef fishery resources.

The main fishery in the Maldives is for tuna and tuna-like species.

The development of the IRRM Programme coincided very well with the aims and objectives of the Programme's Third Phase. Maldives was fortunate in that continuity was maintained in its BOBP activities.

Background

The Bay of Bengal Region is quite diverse in socio-political and cultural terms. It is unified only by similarities encountered due to the tropical fishery ecosystems, the presence of predominant small-scale fisherfolk communities and the diversity in the fish species caught.

Of the BOBP countries, Maldives is one country where the conditions are unique – the main fishery is for tuna and tuna-like species. Only recently has it started exploiting the coastal reef fishery resources. It is also only in the Maldives that the fishermen population is rising. This is due to the new resources that are being exploited; in other BOBP countries, the resources have largely been over-exploited.

The high pressure on resources in the Maldives was on account of the sharing of coastal resources with the growing tourism trade. The other major issue was the lack of well-defined policies, strategies and measures in the management of reef resources.

The other major threat to the resource is the degradation of the environment. Because of the recent economic trends in the Maldives, there has been an increase in coral mining for construction and buildings and loss of mangroves and nursery grounds due to reclamation and deepening of harbours.

Thus the Third Phase of the BOBP was opportune to consider these aspects in fishery resources management.

Objectives and Design

The development objective of BOBP's Phase III is sustainable development in coastal communities. This is the common objective of the participating countries. However, the mix of inputs to achieve the objectives varies from one country to another.

The four principal inputs were:

1. Fisheries management
2. Economic diversification
3. Infrastructure and social services
4. Environmental protection

For the Maldives, the main thrust was on reef resources management and environmental protection (inputs 1 and 4)

The immediate objective was: Increase awareness and knowledge of the needs, benefits and practices of fisheries management among institutions and people concerned at all levels and in all sectors of major relevance to marine fisheries and coastal fishing communities.

All the activities of the Programme were to be implemented through the national institutions in their respective countries responsible for fisheries management and related subjects. BOBP was to closely coordinate with the institutions and assist in any ongoing national efforts.

Considering the knowledge of the fishery resources obtained from the BOBP's second phase and execution of the integrated reef resources management component that emerged from the second phase, the objectives were very relevant to the needs of the sector and the country.

However, there was a need to restructure and improve the performance of the management section of the Ministry of Fisheries, Agriculture and Marine Resources as well as relevant support institutions. The Ministry needed to be strengthened to enable it to prepare and implement fisheries management plans that were emerging through the IRRM process.

Thus, the first and the last principal inputs were not fully integrated with the government's management regime.

The second and the third principal inputs were not very relevant to the Maldives, as the whole IRRM Programme remained a research component throughout the programme.

The environmental aspect of the project was not taken up fully, because there was a separate Ministry concerned with the environment, having its own agenda. However, during the first two years of the programme, marine environmental degradation and the impact of coral mining on the reef fish fishery were considered.

Implementation

As the National IRRMP was a coral reef ecosystem issue, rather than purely a fishery issue, the BOBP faced a major drawback during the last two years. The entire project, but for two technical inputs from BOBP, lacked qualified professional inputs. Thus, there were problems in coordinating research findings and incorporating them into the management decision-making process of the Ministry.

BOBP could not provide technical expertise in the relevant areas because of the Programme's funding limitations. Maldives lacked formal funding for IRRMP both from government and outside donors. This was another drawback BOBP faced in executing its activity in the Maldives.

The technical assistance received by Maldives during the first two years of the programme culminated in a very important national workshop, which provided a comprehensive set of recommendations on how to proceed with establishing the IRRMP in the project area (Vaavu, Meemu, Faafu and Dhaalu Atolls). It was also an important aspect to be considered that the Maldives Fisheries Advisory Board endorsed the workshop's recommendations.

Effect of External Factors

Phase III of the BOBP was initiated during 1994, at a time when globalisation was the rage in international finance. The UNCED process and Agenda 21 were just beginning to take shape. GEF had been born. Thus, international funding agencies as well as international consultancy services were in a state of reorganization.

Within the fisheries sector, the Code of Conduct for Responsible Fisheries and the Convention on Straddling Fish Stocks and Highly Migratory Fish Stocks was approved as well. These two international documents had a major impact on how to operationalise the management regime.

There was also a major thrust on stakeholder participation and NGO participation and a number of restructuring exercises, which the Programme was unable to address, mainly because of lack of technical staff.

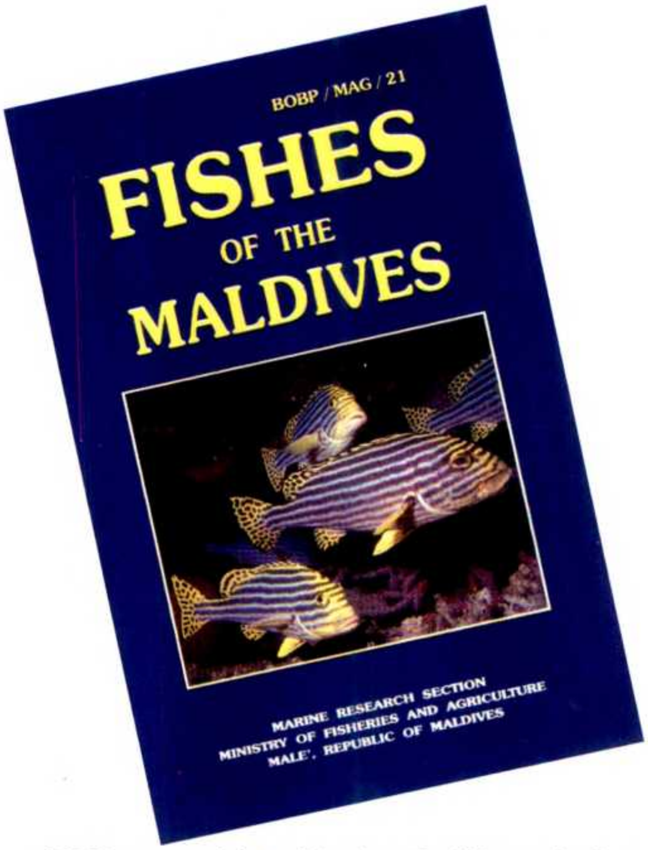
The objectives of the Third Phase of BOBP seem to have been overshadowed. Regional bodies needed to be restructured at the same time. BOBP seems to have been lagging behind in this process. Main reason: The Advisory Committee did not address these emerging issues.

Within the Maldives, there were a number of restructuring exercises, which led to a high turnover of senior policy-making staff within and outside the sector. Thus, the work carried out under IRRMP lost continuity.

The development of the International Coral Reef Initiative (ICRI) was another important milestone for the Maldives, as the entire IRRMP revolved around the guidelines of ICRI. BOBP was largely unable to follow-up the ICRI process.

Achievements

Considering the drawbacks, Maldives was able to achieve substantially the task of formulating the IRRMP. Inputs received from BOBP were meagre because of its staff limitations. However, BOBP was able to organise a number of useful training workshops at the regional


BOBP / MAG / 21

FISHES OF THE MALDIVES

MARINE RESEARCH SECTION
MINISTRY OF FISHERIES AND AGRICULTURE
MALE', REPUBLIC OF MALDIVES

BOBP supported the publication of a 410-page book on "Fishes of the Maldives" in English and Divehi.

level. The Programme did assist in developing and creating awareness among a broad range of stakeholders, from schools, island communities and industry, as well as government organisations. A large number of publications and posters were produced. These helped to popularize environmental aspects and the concept of stakeholders participation. Highlighting traditional management systems and their role in developing management strategies was also an important contribution of the Programme.

Performance of the Government of Maldives

Except for the staff and island communities of Vaava, Meemu and the Marine Research Centre, the commitment received from other concerned institutions was low. This was a major drawback in integrating the findings of the IRRM into the development of a strong legal management system.

An institution concerned that did not meet expectations was the economic planning and coordination section of the Ministry of Fisheries. The Ministry lacked personnel to support the emerging management structure, especially at the senior level.

The other major drawback was the high turnover of staff in related institutions. Except the staff directly involved in BOBP through the Marine Research Center, all the other staff are new. Thus, it has been extremely difficult to sustain continuity.

The other main concern was the lack of a project coordination committee that could oversee the work carried out by BOBP within the country. This was a major drawback in enabling the government to fully benefit from the programme.

Performance of the BOBP

The BOBP's performance was satisfactory. Though the Programme hardly had any technical staff, they have been very helpful. The national project staff and other officials have appreciated their positive attitude. The only shortcoming in the entire project process was lack of technical support from FAO and other relevant organisations.

The Advisory Committee (AC) shares the responsibility for this state of affairs. The Annual AC Meetings have not played their part in strengthening the BOBP as they had done in the past. The AC plays a major role in restructuring as well as in providing guidance to the Programme as a whole.

Lack of co-sponsors was another major drawback in fully benefiting from a regional process such as the BOBP.

Lessons Learned

There is today a greater appreciation of the need for better coordination and consultation in government circles, NGOs, fishing communities and other stakeholders. Some of the drive and impetus for collaboration has come through the effort of BOBP.

The Third Phase relies on national execution of Programme activities, with BOBP playing a catalytic role. This new thrust on national execution has not been fully achieved because of lack of member-country participation in the design process.

Member participation could have been strengthened through TCDC. This would have enabled the process of self-management of a regional body. While the Third Phase of BOBP is coming to an end, the Programme has not been able to draw substantive conclusions as to how a fourth phase if ever will be developed and integrated. This is largely due to lack of inter-country consultations.

If the BOBP is to continue, there must be inter-country consultations, which will assist in the understanding of certain commonalities. Such consultation would require a forum such as BOBP, or a clearing house where such support could be obtained.

Any new Regional Programme of this nature would require very active participation from member-countries in the whole process of managing the Programme, and closer links among participating member-countries, in order to comprehend and tap the pool of expertise and knowledge that is available in the region.

A Regional programme should not be a burden on member-countries but a catalyst and facilitator for further co-operation among them. It should establish mechanisms that would assist in the sharing of expertise within the region.

Future programmes of this nature should win strong support from donor agencies. The proposed GEF project ought to consider some of the views and inputs suggested above before a full-fledged inter-governmental organisation emerges from the experiences of the BOBP.

Regional Expert Consultation on Cleaner Fisheries Harbours Urges Action by Governments

by J A Sciortino

An FAO ports consultant summarises the presentations, discussions and recommendations of a four-day regional consultation on cleaner fisheries harbours organised in Chennai by BOBP and FAO.

The BOBP has since 1985 been promoting cleaner fishery harbours in the region with support from the IMO. It has conducted pilot activities in India, Thailand, the Maldives and Sri Lanka, focusing on awareness-building amongst stakeholders about overcoming pollution in fishery harbours and landing sites.

The key concerns in most fishing harbours and landing sites relate to supply of safe freshwater, sanitation, the collection and disposal of wastes, and the post-harvest handling of fish until it reaches local or export markets. The recent EU ban on fish and shrimp imports from at least three BOBP member countries, attributed specifically to lack of cleanliness and poor environmental conditions, has dealt a serious blow to trade in fish, and could affect the livelihood of millions of fisherfolk.

In the light of the above, the BOBP and the FAO organised a regional expert consultation on cleaner fishery harbours and seafood quality assurance in Chennai, India, from 25 to 28 October 1999. The meeting brought together fishery harbour managers and administrators, fish quality assurance professionals/administrators and harbour design engineers from the seven member-countries of BOBP (Bangladesh, India, Indonesia, Malaysia, the Maldives, Sri Lanka and Thailand).

Dr Kee-Chai Chong, Programme Coordinator of BOBP, inaugurated the consultation. He stressed that fish and seafood must be handled with great care, as food, not like any other commodity or raw material over which sanitation in handling is overlooked and compromised. Consultants J. Sciortino and S Subasinghe highlighted appropriate technologies and approaches and strove to facilitate exchange of know-how and expertise.

The meeting hinged around five major contributions by the consultants — three on fishing harbour infrastructure, two on post-harvest handling and quality assurance. The topics:

- Needs assessment in fishing port design;
- Infrastructural design specifications;
- Fishery harbour management, the port management body, sanitation and waste management;
- Seafood quality assurance in small-scale fisheries and the role of cleaner harbours;
- Handling and storing fish onboard fishing craft and in fishery harbours;
- Status and development of fishery harbours in India.

Mr Rathin Roy of BOBP gave a good presentation on communication skills and the need for a more decisive stakeholders approach to some of the problems afflicting the industry.

The first two days of the meeting were devoted to technical presentations and discussions. The third day saw a practical exercise in rehabilitation of an existing facility, consisting of a visit to Chennai fishing harbour, followed by a "design clinic". The fourth day was used to draw up a set of conclusions to be condensed into the Chennai Declaration (see pages 3 - 4), which the delegations hoped to present to policy-makers back home. A set of recommendations was also adopted.

Technical Contributions

The technical papers presented at the meeting drew wide acceptance. The contribution on Needs Assessment typically raised the need to take the Code of Conduct for Responsible Fisheries and the technical annexes more seriously. In particular:

* The need to match the size of harbour facilities to the known resources;

* The importance of ensuring environmental compatibility when fisheries facilities are being planned or upgraded;

* The importance of supply of clean water with any fish landing facility;

* That sanitation without some type of water supply (clean fresh or sea water) is not possible.

The paper on Infrastructural Design Specifications highlighted the typical problems facing cash-strapped administrations who have to pay for much-needed maintenance. Those present agreed that unless life-cycle costing of infrastructure is taken into account at the construction and tendering stage, least-cost methods of procurement have the capacity to bring a fishing harbour to its knees. The typical items of infrastructure, which everybody agreed needed better specification, are:

* Water supply systems and plumbing in general;

* Auction hall floors and drainage.

The paper on Fishery Harbour Management laid bare current shortcomings in harbour management. Of particular importance with harbour management bodies, where they exist, is that these must be manned by the right people who understand the fishermen's needs. Feedback from stakeholders, enforcement of regulations, waste management, good housekeeping and sanitation all depend on good management practices.

The paper on Fish Quality Assurance highlighted the plight of countries affected by the EU ban and the role that cleaner harbours can play in ensuring that fish landed in these countries does not get contaminated.

Fishing harbours, though not strictly classed as processing facilities, have a lot in common with food processing plants in that they produce food for consumers when fish is auctioned off for the local markets. The HACCP concept used in food processing plants can be emulated at the harbour facility to provide a management tool with which to combat contamination.

The paper on Post-Harvest Handling presented the delegates with an excellent little video clip produced in the South Pacific region, dealing particularly with the low-volume, high-value end of the artisanal sector.

The Indian paper on the current status of fishing ports in India presented an overview of the Indian fishing effort. However, as some delegates pointed out, there does not seem to be a connection between the proven resources and the entry of new vessels into the fishing effort (the construction of the new finger piers at Chennai appears to have strengthened the local fleet considerably, concentrating too much fishing effort in one area). This matter was discussed in great detail during the follow-up sessions on the third day.

BOBP and the Future

With the approach of the new millennium, BOBP enters a new and challenging era, partly because existing funding arrangements have ended, partly because of the growing need for more work in this field as soon as fish-importing countries start implementing the risk assessment approach to fisheries.

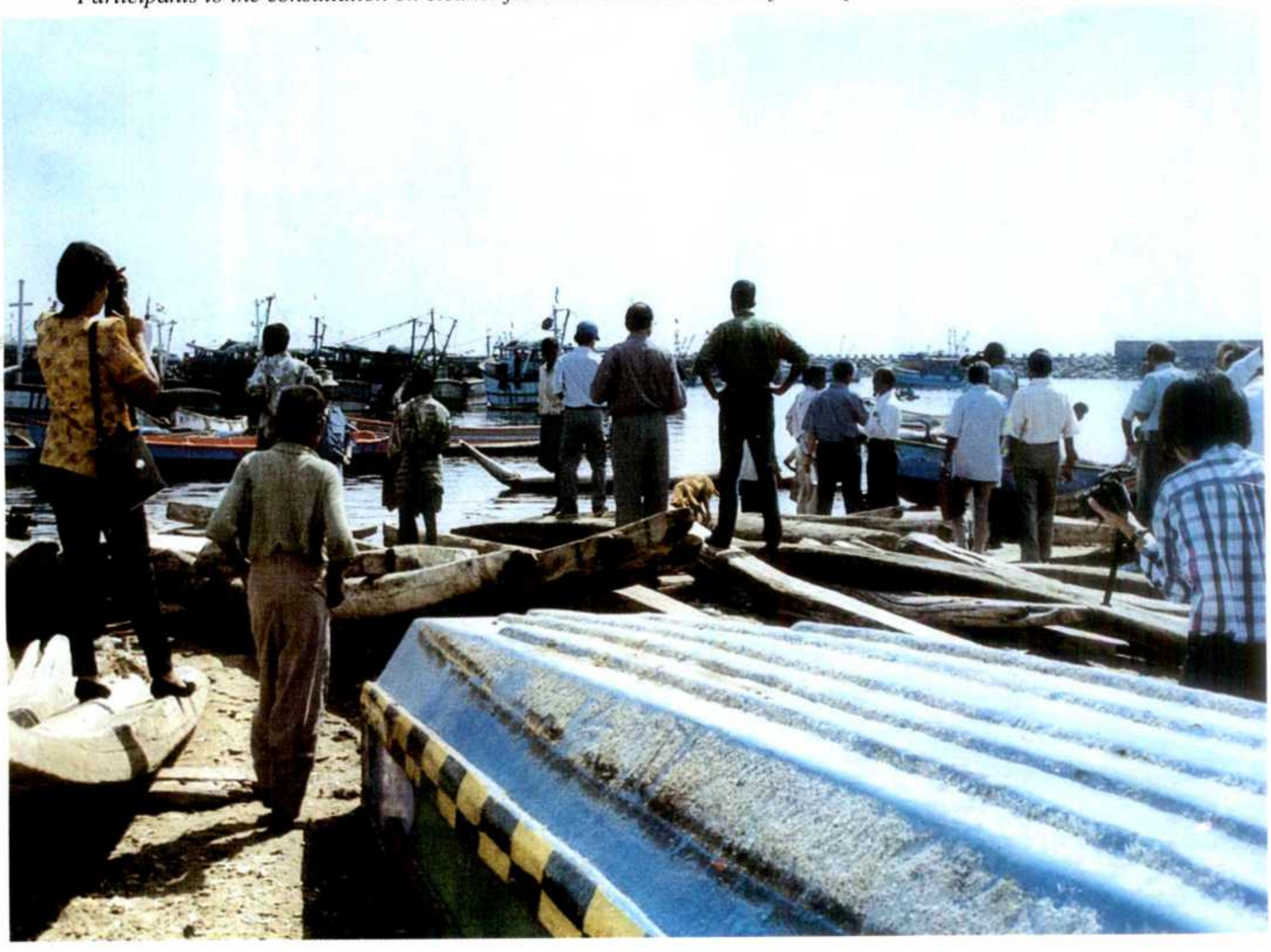
During the course of these discussions, the author said that the vast amount of information and goodwill BOBP has created cannot be let to gather dust on a shelf when so much still needs to be done, and when local consumer demand for good-quality fish is rising fast. The proposed Global Environment Facility (GEF) project that will succeed BOBP, and the prospect of turning BOBP into an Inter-Government Organization (IGO), was also discussed.

In conclusion, the author, together with the coordinating team, suggested that the Member-Countries themselves show the way forward by putting into practice the lessons learned at this meeting.

It was proposed that each country choose one facility to upgrade to the required standards and then use it as a living laboratory for Department of Fisheries staff, management bodies, consultants and designers.

The Consultation passed the Chennai Declaration (see page 4).

Participants to the consultation on cleaner fisheries harbours made a field trip to the Chennai fishing harbour.

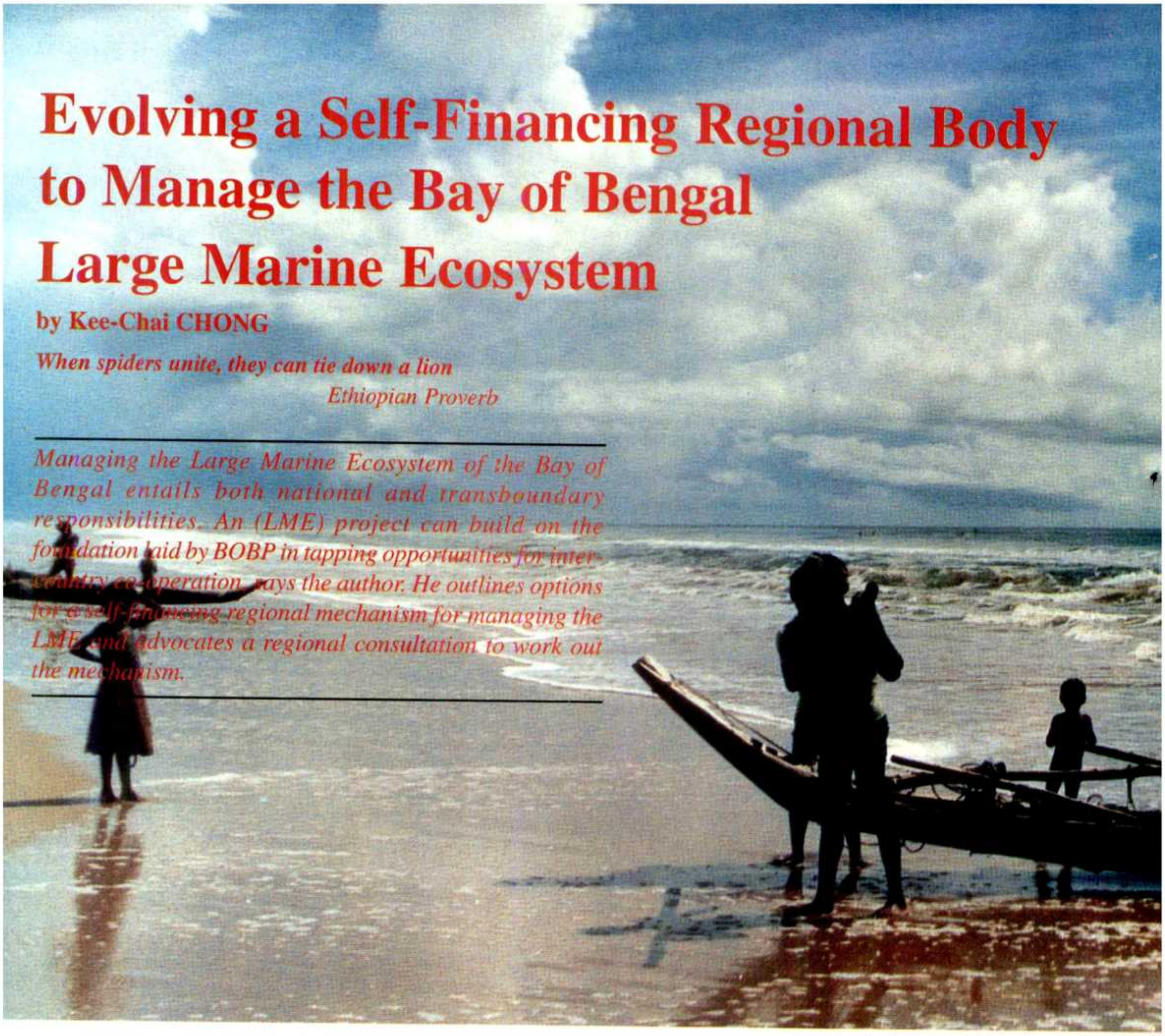


Evolving a Self-Financing Regional Body to Manage the Bay of Bengal Large Marine Ecosystem

by Kee-Chai CHONG

When spiders unite, they can tie down a lion
Ethiopian Proverb

Managing the Large Marine Ecosystem of the Bay of Bengal entails both national and transboundary responsibilities. An (LME) project can build on the foundation laid by BOBP in tapping opportunities for inter-country co-operation, says the author. He outlines options for a self-financing regional mechanism for managing the LME and advocates a regional consultation to work out the mechanism.



Poverty is endemic in the Bay of Bengal region. It cannot be banished in the short term. But lack of access to food, water and air should be addressed immediately and not allowed to get out of hand. Our human and environmental insecurity is largely self-inflicted — it's our activities that have degraded the environment. By managing and regulating our own activities, we will lessen our individual and collective vulnerability to environmental changes from natural causes that are beyond our control or influence.

BOB Large Marine Ecosystem

The Bay of Bengal (BOB) is one of the world's 49 Large Marine Ecosystems (LME). The Bay is relatively shallow, especially in the north or upper reaches of the LME. Because it is shallow, ocean and sea current exchange is minimal in the LME and adjacent seas. The hydrology, hydrography, bathymetry and trophodynamics of the Bay, and therefore its productivity and biodiversity, are heavily influenced by the continent's major river and estuarine systems — the Ganges-Brahmaputra-Meghna riverine network and to a lesser extent, other rivers such as the Mahanadi, Godavari, Krishna, Cauvery and Irrawaddy.

The waters of the Bay are not as saline as those of other bays, due to the spread of fresh/estuarine water far into the sea. As a result, certain coastal marine species are not commonly found in the Bay — clupeids, for example. But zooplankton, fish eggs and larvae of other commercial species are found to be abundant.

The total length of the coastline of the countries straddling the Bay and its adjacent seas is about 105,000 km (excluding Myanmar's coastline). The Bay of Bengal is a relatively productive fishing zone of the Eastern Indian Ocean (FAO Statistical Area 57). Small-scale fisheries is practised in waters up to 10 m depth, while most marine fisheries are found in waters up to 10-50 m depth. More than 300 fish species are estimated to be of commercial value in the Bay's LME.

Small-scale fisheries operators in the Bay are still largely traditional. In many coastal areas of the Bay and adjacent seas, fish are still landed on open beaches, as fish landing centres or fish harbours are few and not conveniently located for many small-scale fisherfolk. Many of these fish harbours are unsuitable for small-scale fishing craft. Given the small size of fishing boats and the height of the harbours' docks, piers, jetties or quays, the boats cannot make use of the available facilities in

Pic. E. Amalore

these fish harbours. There is a mismatch between facilities and users. Private jetties are therefore quite common in the region.

On-shore management of the fishing crew and craft before they leave for fishing or after they return is impractical because the fish are landed all along the coast and not at the fish landing site or harbour provided. Fisheries management does not have to be carried out at sea, it can be done while the crew is on shore. If such management can be done on shore, management will be less costly and probably more effective.

Importance of Fisheries

Fisheries contributes between 0.2 % and 2 % of the national gross domestic product (GDP) in the countries around the Bay of Bengal. But what fisheries does for national nutrition, health and survival is even more significant. Fish is a source of much-needed animal protein for coastal populations, as well as a source of livelihood and jobs.

Yet, joblessness and food insecurity among coastal populations remain high. Since they are unskilled and lack formal education, they have little to offer other than manual labour. Industries are confined to urban centres, partly due to Government policies. Prospects for jobs in agriculture are limited — it is small-scale in nature. So the opportunity cost of labour among coastal populations is very low.

Need for Regional Management

Except for a limited or piecemeal approach to resource management by countries within their own waters, there is at present no effort to manage the Bay's LME on a regional basis. Such efforts, if any, are undertaken individually and independently within the country's own territorial/EEZ waters by the coastal states bordering the Bay.

Bounded by India and Sri Lanka to the west, Bangladesh to the north, and Myanmar, Thailand, Malaysia and Indonesia to the east, the BOB's LME covers an area of 2,215,000 km^2. More than a quarter of the world's population is found in the Bay of Bengal countries. The BOB's LME supports some 6-8 million fish harvesters directly, and more than 35-40 million others indirectly. Fifty per cent of the total catch of the Indian Ocean fisheries, or 3.45 million tons in 1993 is caught from the Bay LME. India, Thailand, Myanmar, Indonesia, Malaysia and Bangladesh accounted for 95.6 % of the 3.45 million tons of fish landed in the Eastern Indian Ocean (Statistical

Problems and Concerns Relating to Coastal and Marine Fisheries Development and Management in the Bay of Bengal Region

[An Annex to the Report of the 24th Meeting of the Advisory Committee of the Bay of Bengal Programme]

1. Over-fishing of stocks is increasingly becoming visible, indicated by declining catch-per-unit-effort, reduction in average size of species, changes in catch composition and increasing levels of landing of trash fish.
2. Conflicts between commercial fishers and small-scale fishers and amongst small-scale fishers are on the increase.
3. Destructive practices of fishing, which excessively target juveniles or gravid females and are non-selective, are on the increase and not only affect fishery resources but also, more importantly, damage habitats.
4. There is concern about excess capacity in fisheries, resulting in economic hardship amongst fishers and undermining the economic viability of fisheries.
5. Excessive fishing effort, destructive forms of fishing, land reclamation and a variety of coastal activities are degrading and reducing the areas of rich biodiversity, spawning and breeding grounds such as estuaries, coral reefs, sea-grass beds, mangroves and lagoons.
6. Several of the more important and detrimental impacts on aquatic resources and habitats result from other sectors which are beyond the purview, control and jurisdiction of fishery agencies.
7. Tourism, and even eco-tourism, is poorly managed and the detrimental effect on aquatic environments from this sector is increasing.
8. Coastal and marine eco-systems are being increasingly affected by industrial effluents, sewage from human habitations and coastal activities.
9. Stakeholders and the public are generally not aware of conservation and resource sustainability issues, resulting in actions that are detrimental to the coastal and marine environment.
10. Rational management of coastal and marine resources and habitats is severely hampered by conflicts of interest arising out of highly specialized and compartmentalized administration by a large number of mostly un-coordinated agencies, with varied and often overlapping interests and objectives.
11. Non-tariff trade barriers are increasingly being applied to fish and the fish-product trade, resulting in lowered earnings and unfair trade relations.
12. Approaches, methods and techniques are often inadequately developed to address the needs of:
    - Rehabilitation of natural resources and habitats;
    - Monitoring, EIA and risk assessment of coastal aquaculture and mariculture;
    - Management of aquatic protected areas and sensitive specialised habitats;
    - Development and management of environment- friendly coastal eco-tourism;
    - Prevention and control of pollution and contamination of conservation areas and protected areas.
13. Lack of availability of sound, timely and reliable information on aquatic resources, their habitats and utilisation affects the quality of decision-making in management.
14. Fisheries and related policy is often not geared to give direction to actions and address new and emerging concerns and requirements of:
    - Coastal, particularly small-scale marine resources management;
    - Management of coastal aquaculture, particularly shrimp farming;
    - Management and sustainable utilisation of mangroves;
    - Rational classification of coastal areas for conservation, fisheries and other uses;
    - Management of marine fisheries;
    - Management of mariculture.
15. Fisheries and related legislation has not kept pace with developments and are often not geared to support, regulate and give direction to new and emerging activities relating to:
    - Management of coastal and marine fisheries;
    - Management of coastal aquaculture, mariculture and mangroves;
    - Conservation and sustainable utilization of critical aquatic habitats;
    - Practical enforcement procedures to promote compliance;
    - Prevention and control of pollution from land and sea-based sources of coastal and marine ecosystems.
16. Poorly developed marketing channels for fish and fish products result in wastage and fishers receiving unfair prices.
17. Poor quality assurance of fish and fish products, especially in the large unorganized small-scale sector, may jeopardize earnings of fishers and trade in the region.
18. Fishery agencies, while often well equipped in terms of technical expertise, often have inadequate capacity to address the increasingly multi-disciplinary and complex issues they face. Rational and long-term human resource development is a neglected area in most fishery agencies.
19. While several excellent fisheries research and training institutions exist in the region, their distribution is uneven.
20. Mechanisms to promote sharing of knowledge and experience and to collectively understand and address common and shared problems are inadequate and often inaccessible.

Area 57) in 1993. Sri Lanka and the Maldives are in Statistical Area 51 (see Figure).

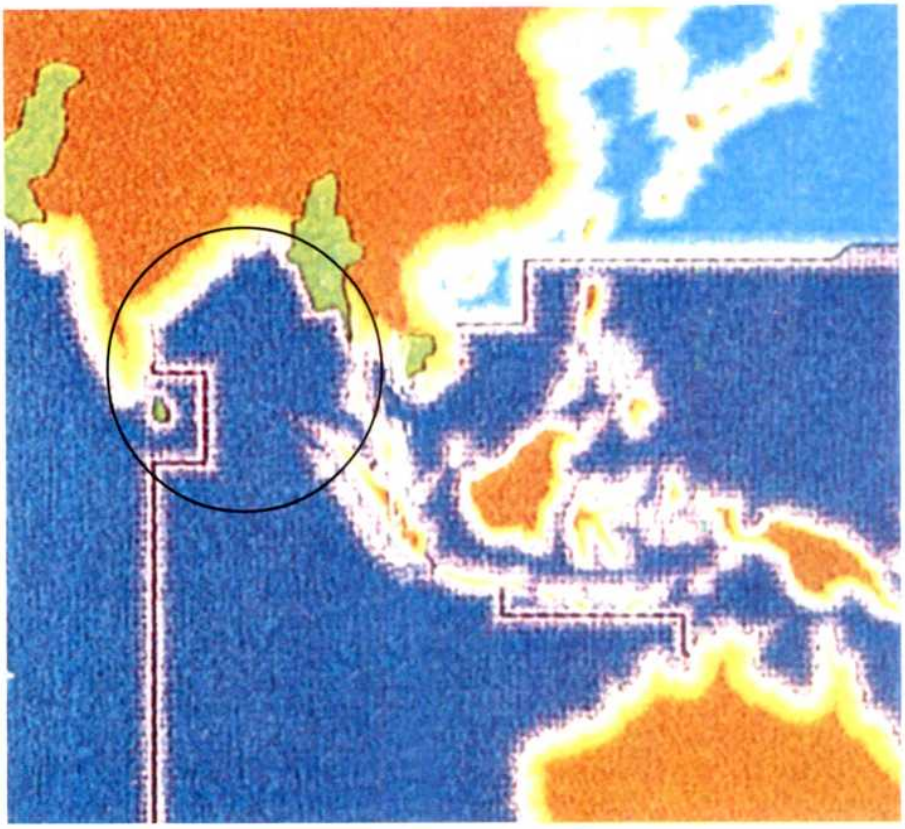
There is today growing recognition of environmental problems of a transboundary nature. The nature of the BOB's LME is such that there are and will be both national and transboundary responsibilities and functions in its management and conservation for sustainability. Building on the foundation already put in place by the 20-year old BOBP, the LME presents excellent cross-border and trans-frontier opportunities for co-operation and joint management action. Establishing a regional approach to transboundary issues and problems is a policy and institutional necessity whose time has come because of the increasing threat of unsustainability. (See box on page 22).

Resource management is a long-term commitment and investment. To succeed, it takes time, especially if the management style changes from a techno-bureaucratic government system within the borders of each country to a consultative and participative regional system. Within the Bay, there are already well-demarcated land and maritime boundaries duly acknowledged by the Bay's coastal states. In other words, there is no territorial dispute which can become taxing when a regional mechanism is to evolve for managing the Bay's resources and ecosystem.

Threats

The BOB's LME is under increasing threat from various sources — both human-induced and natural. The causes in most cases are anthropogenic.

- excessive siltation and sedimentation from extensive and large upland riverine basins and catchment areas, due to extensive deforestation and land remodelling, human settlement, industrial development, dam construction etc.
- excessive run-offs from agriculture and ship-breaking, resulting in excessive inorganic and organic nutrient or heavy metal nutrient overloading
- incessant dumping of solid and liquid waste, oily waste and garbage from urban litter into the waters of the Bay.
- coastal construction and land remodelling — port construction, resort construction, and tourist facilities development, not to mention sand mining.
- excessive untreated industrial and municipal discharge of pollutants, sludge and sewage respectively – sewage in particular, as it is still the single largest source of coastal pollution.
- growing eutrophication of coastal waters, posing immediate risks to humans (e.g. beaches unsafe for recreational use).
- sea bed destruction/impairment not only from trawling but from organic sediment loading and debris or junk.



The Bay of Bengal Large Marine Ecosystem.

Many of these pollution sources are from beyond their points of origin. As a result, the natural biological and ecological processes are hampered, if not distorted. The upshot is that the water condition and water quality in the Bay decline, as water pH turns acidic. This is especially so in nearshore and estuarine waters. Globalisation and international shipping are further degrading water quality and the marine ecosystem through ballast water discharge, and the introduction of exotic species which could be detrimental to species endemic to the Bay's LME (see article on pages 28-31). Further, exotic organisms brought in from the fouling of fishing nets and gear that occurs in waters overseas is another risk factor. Oil spills are another hazard. The Bay water is further jeopardised and impaired by inorganic waste loads — heavy metals such as copper, zinc and cadmium.

Of all the world's major seas or oceans, it appears that it is the Indian Ocean, including the Bay of Bengal, where fisheries resources may not have completely succumbed to overfishing. In fact, these waters still yield good catches. The sizes of fish landed are still relatively large. Yields are still being maintained. Experience shows that fisheries sustainability and the conditions of the habitats are sensitive and respond to management. Ecosystem management aims at sustainable human use of resources – as long as ecological processes are maintained.

LME Approach to Management

The concept of the LME fits into the need to develop a regional ecological management framework. The management of the Bay's LME should be ecological rather than biological as conventionally practised – e.g. fisheries management dominated as it were by fisheries biology, with emphasis on life cycles and life history. Ecology encompasses not only the fisheries and aquatic resources along with their habitats and ecosystems, but more importantly, human ecology and its relationships with the ecosystem, including the intricate balance between yield and carrying capacity. Implied in this assertion on ecological rather than biological focus is the human capacity for management, unlike other living species on this planet, which are incapable of managing their use.

The demarcation of geo-political boundaries would strengthen the regional role and responsibility to start to protect and manage the Bay's resources. The work undertaken by BOBP thus far has shown that there is an urgent need to respond to the pressing problems of transboundary issues in fisheries and aquatic resources management, especially those that straddle national jurisdictions. It is no longer sufficient to just manage resources and ecosystems within a country's borders. Joint management on a trans-frontier basis is needed.

In closing, fisheries and aquatic resources management, to be effective, require intervention and action not only at the local and national levels but also at the regional level. It is thus important for the Bay's coastal states to come together. If agreement can be reached to work together there are clear and real benefits to be gained by all.

Self-Financing of Regional Management

With governments forever severely short of funds, fisheries and aquatic resources management has to pay for itself. Self-financing regional management of the BOB's LME is a concept whose time has come and is worthy of in-depth consultation.

Some Funding or Cost-Cutting Options

- The trade in fish is soaring. Industry must share some of its profits to finance the costs of management. The rubber industry in Malaysia does so, through two types of cess (see *Bay of Bengal News*, June 1998).
- Management and enforcement costs must be trimmed. The existing fisheries enforcement work force must be utilised better. On-shore management of fishing effort must and can be stepped up to cut the cost of expensive air and sea surveillance.
- A management trust fund could be created with contributions from governments, industry, banks, endowments, international agencies, etc.
- Governments must delegate management responsibility and authority through stakeholder-participatory community-based fisheries management (CBFM). CBFM is presently practised mainly for nearshore and coastal waters. The community helps ensure compliance with management measures.
- As for offshore patrolling, a good part of it can be done efficiently onshore. All it takes is visits by enforcement officers to fishing harbour jetties for random inspection and awareness-building to educate them about the need for management and the benefits from it.
- A system of collection of royalties on catch landed, based in part on the 1954 classical Scott Gordon model on fisheries.
- Product promotion to generate funds, e.g. telephone cards, credit cards etc.
- Reduction of excess fishing capacity at the local, district, state and national levels through licensing, and limited entry or non-renewal of fishing licences.
- Attracting fishing boats and fisher-folk out of fisheries through alternative or supplemental employment opportunities.
- A user fee, as also an environmental cess system must be carefully explored and introduced. People's willingness to pay for essential services is often under-estimated. Similarly, a polluter pays principle can be instituted.
- Fines must be levied for violations of fisheries management regulations. (In 1987, almost 50 % of the total fisheries revenues in Malaysia were derived from fines imposed on the use of illegal gears).
- Those who overfish, or inflict damage or destruction on the fisheries, its stock and habitats, must pay for the damage.
- Banks and other financial institutions may contribute to management by lending money against exports of seafood and grants or endowment.
- Certain management services such as sea patrolling or inspection of fishing vessels could be privatised.
- A regional or international consultation should be convened to help evolve a self-financing system for ecosystem management. Resource persons should work out in advance the economics and mechanics of various options, such as those cited above.

Concluding Remarks

Just as it has done for the last five billion years, the earth system will continue to evolve. Nature has withstood planetary strain and upheavals down the ages. Just as the human body calls for repair and maintenance to keep it going, the living earth also requires periodic repair and maintenance. Humans have inflicted the greatest damage to the environment on which our very survival depends. Human numbers must be moderated through population and family planning. Yield must be related to and balanced with human caring and Nature's carrying capacity.

The Bay's coastal states must seriously address these environmental threats through management. Left unmanaged, they will alter the future use of the LME resources — not least the fish yield from the Bay's waters which the teeming population takes for granted. The BOBP must press on with its work in promoting better management of the Bay's resources and ecosystem, not only within the national jurisdiction but beyond — in the LME.

Bay of Bengal Programme: A Farewell and a Beginning

by Venkatesh Salagrama

The author, who has been involved with BOBP work in various ways over the years, says that BOBP's outstanding achievement is its emphasis on people – involving them as partners in research and development, empowering them to accept or reject any new intervention. "BOBP may not be the only four-letter word that many fishers on India's east coast know, but it is certainly one of the better known."

As the Bay of Bengal Programme (BOBP) comes to a close shortly, one is tempted to become rather sentimental and nostalgic about 'the good old BOBP' and start meandering down memory lanes. But the sobering fact that it leaves behind - self -confessedly – no more than 'a foot print in the region', makes it necessary to assess the role it has played over the last two decades and what its closure means to the fisheries development in general and small-scale fisherfolk development in particular. It is perhaps not for someone who has been a part of the organisation for most of his career to assess the work done by it, but my association with BOBP spans a range of relationships, which, hopefully, gives me the freedom to talk about it. Much of what I say comes from my knowledge of BOBP's work on the east coast of India and certainly, this attempt will be coloured by a tinge of sentimentality with the colouring done in broad brush strokes to satisfy the requirements of a short article. And, it is possible that there are many people who will take issue with my paean to the BOBP.

A few lines of autobiography, I hope, may not be out of place, because I was a BOBP child. I grew up listening to the valorous exploits of the BOBP 'consultants' (the first time I ever heard of the tribe) with names which were mostly unpronounceable, but who were as vivid as (and more real than) Superman, Spiderman or Hanuman to a growing boy. They had a certain flamboyance which I realise now reflected imagination rather than reality, because the people I did meet after joining the BOBP were anything but flamboyant. But the stories that were told of their exploits became legendary, and continue to remain so in many areas. If you went to a fishing village like Uppada in Andhra Pradesh or Pentakota in Orissa, chances are that you would be told countless anecdotes about BOBP, which makes you begin to wonder whether they were not making the stories up – 'mythologising', as it were. The mystery deepens when you consider that the BOBP never had a regular office either in Andhra Pradesh or in Orissa, nor any staffer who spoke either Telugu or Oriya.

When it came to choosing a profession, I certainly had no second thoughts. Looking back, I do not think I could have made a better decision, although working for the BOBP was not without its share of problems. You were expected to know everything under the sun – the mere fact of your association with the BOBP in whatever manner gave you a halo and elevated you to the status of an 'expert' and whatever you said was given the attention that is generally reserved for saints. For the second-generation entrants like me, BOBP's pre-eminence was, at times, a millstone around the neck: a baggage that one was forced to carry everywhere.

Having said that, I must admit that it was an exhilarating experience. It was the freedom that one was given in developing an idea into a concrete action that made it possible to achieve results. It was the fact that one was constantly 'in the field', testing out new ideas, concepts, approaches, and, yes, new technologies, with people who matter - the fisherfolk and the agencies that work with them – that gave the activities a

coherence, a meaning and an existence. It was the constant give-and-take, learn-and-teach, listen-and-speak that provided fodder to the thought grinders. And it was the ennobling feeling of having shared what little you know with someone who needed it that made you feel proud. And I am sure it is the same pride that ignited those hundreds of extension people all along the East Coast of India to take their work and their association with the BOBP so seriously, that accounts for their continued interest in its wellbeing.

If one were to attempt to sum up the work of the BOBP, what stands out most prominently? Notable as several BOBP activities were, it was the emphasis on people – involving them as partners in the research and development processes, allowing them to judge activities using their own criteria, empowering them to accept or reject any new intervention – which is an outstanding achievement of the BOBP. Its emphasis on small-scale fisheries development, at a time when development was equated with 'hi-fi' things like mechanisation and industrialisation was, as it turned out, a significant milestone in moulding and changing attitudes in the area of fisheries development. That some governmental development programmes targeting small-scale fishing communities are still called 'BOBP programmes', long after BOBP withdrew from the activity, dramatises the emphasis that it placed on small-scale fisheries and fisherfolk, and the imprint it has left in the minds of people as an organisation for their development. BOBP may not be the only four-letter word in English that many fishers on the East Coast of India know, but it certainly is one of the better known.

That will be the enduring legacy of the BOBP: putting people first. People-centred approaches, participatory development, bottom-up planning and implementation strategies, sustainable livelihoods, responsible resource management, alternative income generating opportunities – BOBP was either prophetic or ahead of its time, but all these issues were an integral part of its work, much before they became development buzzwords. Only, the BOBP did not often seem to catch up with the current development jargon, which made it look old-fashioned.

Other outstanding features of BOBP's work include : multi-disciplinary approaches to fisherfolk development, flexibility in project design and execution, and that most popular activity by which most people know the organisation : information dissemination. The publications of the BOBP are what made it a household name in the fisheries sector. They were by no means exhaustive nor were they expected to be, but their popularity – particularly among the staff of the Department of Fisheries in many coastal states – is astounding. An almost imperceptible, but equally important, activity was the forging of vertical linkages within organisations, such as the Department of Fisheries. One need look no farther than the Orissa Marine Fisheries Extension Service to understand the high levels of motivation that the BOBP was able to instil among the staff, by merely allowing them to exercise their own minds, and ensuring that whatever they came up with was listened to and acted upon at the upper echelons.

Broadly, the BOBP is an example of what a small, well-motivated organisation (with few constraints by way of financial limitations, of course) could achieve in terms of effective fisherfolk development. Take a look at any craft and gear introduction, talk to any marine fisheries extension officer, or read any BOBP publication – and you will know what I mean. From fisheries development to fisherfolk development to fisheries management, the BOBP travelled a long way, and carried many others in its wake.

Someone recently asked me: "Could the impact of BOBP have been greater had it been done differently"? The Programme's initial technology focus never quite faded away, but over the years a change in attitudes and approaches is very clear. The Programme was quite clearly interested in working mainly through the government organisation, although it did work with some NGOs in the later period, and this restricted the range of organisations which could have benefited from the Programme to some extent. To what extent the Programme has been able to change attitudes and approaches at an institutional level among the partner organisations is unclear, and this is a handicap that could have been avoided, had the range of partner organisations been broad enough.

My favourite grumble about the BOBP is that it often shied away from taking credit where it was due. One could sense a kind of shame when someone 'admitted' to have been involved in the fishing craft development programmes. Agreed, increasing fish production is no longer a politically correct way of doing things, but it has to be seen in the context of its times. If the traditional fishermen in Andhra Pradesh or Orissa regard the BOBP highly, it is mainly for introducing fibreglass as a boat building material, and had it not been for the fibreglass technology, the communities would have fared much worse in the fight for survival. What this shying away meant was that valuable linkages that had grown between the organisation and the people, which could have been put to very effective usage – such as promoting resource conservation measures – were not made use of. The sense of continuity is very important in a relationship, and this was, I feel, lost unnecessarily.

However, a more important question to ask now would be: "Could small-scale fisherfolk development have been different if there was no BOBP?" On the answer to this question would hinge another, even more pertinent question: "When BOBP does the vanishing trick, will the small-scale fishing communities lose anything?" I would not attempt to answer these questions because most people know what the answers are already, but with the closure of the BOBP imminent, the time has come to answer them in more concrete terms as the following discussion makes clear.

Why target small-scale marine fisherfolk? Why does the BOBP confine itself to small-scale fisheries, when it could spend its time, money and effort more profitably in other areas? This question might seem a bit dated now, but one which plagued me in the early 1990s wherever I went. Quite possibly, it was questions of this nature that led to the establishment of so many fisheries research institutes in the country, but not one to deal with small-scale fisheries development. From mid-1990's, most research institutions have at least shown an interest in undertaking more people-centred research, but the proceedings of the numerous workshops, seminars, symposia et. al., continue to show that the new interest in people-centred research and development was more wishful thinking than actual practice. That this 'trickle-down' approach has not been very successful is generally accepted now.

Thanks to the 'developments' in the last two decades, newer areas of concern are cropping up more frequently than in the past. Issues related to declining biodiversity, the impact of increased marketability of fish on poor processors and consumers, lack of alternative sources of income, increasing need for capital for replacement of productive assets, widening social gap between the rich and the poor within the fishing communities, increased vulnerability to natural disasters as a result of deforestation and other causes, and marginalisation of traditional (indigenous) community-based knowledge and management systems, are some of the concerns that need deeper and more urgent understanding. Their impact on small-scale fisherfolk is particularly distressing, and the marginalisation of the more vulnerable among them is nearly complete.

Much of the ongoing development effort is still aimed at increasing harvests and meeting targets. When resource management is considered at all, the initiatives would take the form of bans and regulations, which are seldom enforceable. And in small-scale fisheries, a few standard 'welfare' programmes – which are often too inadequate anyway – are taken up rarely with a clear understanding of the communities' concerns, needs and opportunities. The more influential sections in the communities have mastered the rules of the game quite well, and a new elite has emerged in most villages which would do anything to protect the status quo.

That does not mean that all current development work targeting small-scale fishing communities is wasted. It might be true that whatever has been taking place often serves its purpose very well indeed, but not because of any clear understanding of issues on the part of the implementers. The main concern right now is that, after all these years of work, we still do not have much vital information about the fishing communities. There are grey patches in our knowledge of the people, their modes of thinking and their priorities. There is a huge gulf between 'us' and 'them', which is bridged by sinuous linkages like the one that BOBP provided, and many NGOs are providing now, but these are at best efforts to cross the gulf rather than bridge the gap permanently. It is said that one can never fully understand a way of life which is different from one's own. The painful conclusion one often reaches after seeing huge infrastructural facilities put up by development agencies which are never used by the communities is that we have not understood the communities *at all.* This lack of understanding – empathy, if you will, because there is often more sympathy than is necessary with disastrous results – creates all the confusion and chaos that generally characterises any programmes concerning fisherfolk.

The example of the BOBP provides a model approach for fisheries development. It stresses that a multi-disciplinary, multi-sectoral, and multi-faceted organisation is absolutely essential to generate and disseminate knowledge about the small-scale fishing communities, and to experiment with new approaches and strategies for effective implementation of development programmes. For these twenty years, the BOBP's own existence – albeit in the 'footprint' mode – served as an excuse for letting sleeping dogs lie, and understandably so, because it was a learning process that the BOBP embarked on, and whatever it learnt – both successes and failures – would be invaluable for a successor organisation to take into consideration. But it becomes a matter of urgency to start a 'Central Small-Scale Fisheries Research Institute' which will have experts from different disciplines in social sciences and natural sciences, from anthropology to zoology, micro-enterprise management to sustainable livelihoods. The organisation will be autonomous, open to everyone who is interested in development, continues to bring out newsletters and other publications, conducts dissemination campaigns, works closely with all organisations at all levels on all issues including credit, marketing, conservation, ecology and environment, and more than anything else, it will be PEOPLE-CENTRED. Just like the BOBP. And that will be the fitting tribute to the good old Bay of Bengal Programme.

Is any one listening?

Managing Problems Associated with Ballast Water Discharges in Malaysia

By Ainul Raihan Hj. Ahmad

Centre for Coastal and Marine Environment, Maritime Institute of Malaysia

Harmful aquatic organisms can be introduced into the coastal and marine environment through the ballast water used to keep ships safe and stable. Australia, New Zealand and the US have promoted voluntary codes of conduct to reduce risks of this kind to the environment. This paper reviews the present status of ballast water discharge management in Malaysia. It also discusses theoretical concepts about the collection of baseline data to manage ballast water discharge.

Introduction

The introduction of aquatic organisms through ballast water can subject marine and freshwater ecosystems to serious risk, with economic repercussions. The infestation of zebra mussels in the Great Lakes of the United States, for example, altered the freshwater ecosystems of the US and caused major economic damage. It is estimated that by 2000 A.D., the US will be spending US$5 billion to control an invasive mollusk.[1] It was introduced to the Great Lakes via ballast water taken from the freshwater of European ports.

The ballast water issue was first brought to public notice by Australia in the late 1980s after toxic dinoflagelletes were discovered in Australian waters. In more recent years, the issue of ballast water has raised grave concern among the international community. A draft regulation for management of ballast water had been tabled for discussion by the working group of the Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) during the 43rd MEPC meeting of June-July 1999. The form of this legally binding instrument is still pending for decision. The question is whether to consider the addition of ballast water as a new annex to the International Convention for the Prevention of Pollution From Ships 1973, as modified by the Protocol of 1978 (MARPOL 73/78), to amend the existing annex, or adopt an entirely new convention.[2]

Australia, New Zealand and the United States are among the countries that have been proactive in the ballast water issue. They have adopted a responsible approach by introducing a voluntary code of conduct to reduce the risks of invasion of harmful aquatic organisms via ballast water in their coastal and marine environment. Research, nevertheless, continues to intensify to find effective control measures.

This paper is based on a preliminary literature survey and discussion with relevant authorities. Its main objective is to review the present status of ballast water discharge management in Malaysia as well as to present theoretical concepts on collecting baseline data for the management of ballast water discharges. This will be based on the experiences of countries that are actively pursuing the matter and have expertise in the area. This paper intends to do so by addressing a number of questions related to the management or control of problems associated with ballast water discharge in Malaysia.

First, the paper will discuss the amount of research that has been carried out on the subject in Malaysia. Second, the paper will examine the level of awareness among responsible agencies of the potential impact ballast water discharges could have on Malaysia's marine environment and the need to control such activities. Finally, the paper will suggest some pointers for initiating a programme to control ballast water discharges.

Ballast Water

Ballast water is used for the safety and stability of ships.[3] It is important for maintaining adequate propeller depth, adjusting the ship's depth in the water and compensating for currents and wind forces. In general, there are three reasons why ballast is essential, depending on the vessel types. For tankers and dry bulk carriers, ballast water will be used in large quantities to make up for weight lost after unloading the cargo they carry. Ballast helps ships like ferry, military and fishing vessels to maneuver and facilitate control during loading conditions, provide stability, trim and heel. Ballast is also required for ships such as heavy lift vessels for loading and unloading operations.

The ballast water capacity of most ships is about 25 to 30 per cent of their dead weight tonnage. Normally, a vessel will carry 25 per cent load of ballast water of its full ballast capacity that ranges from 13,500 gallons of ballast water to 9.3 million gallons of water. The ballast intake will most likely increase if the trip is long and the weather condition is unfavourable.

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[1] **Hayden, Barbara.** 1995. Nature and Magnitude of the Problem *International Perspectives, New Zealand.* This paper was presented during the National Ballast Water Symposium in Wellington, New Zealand in 1995.

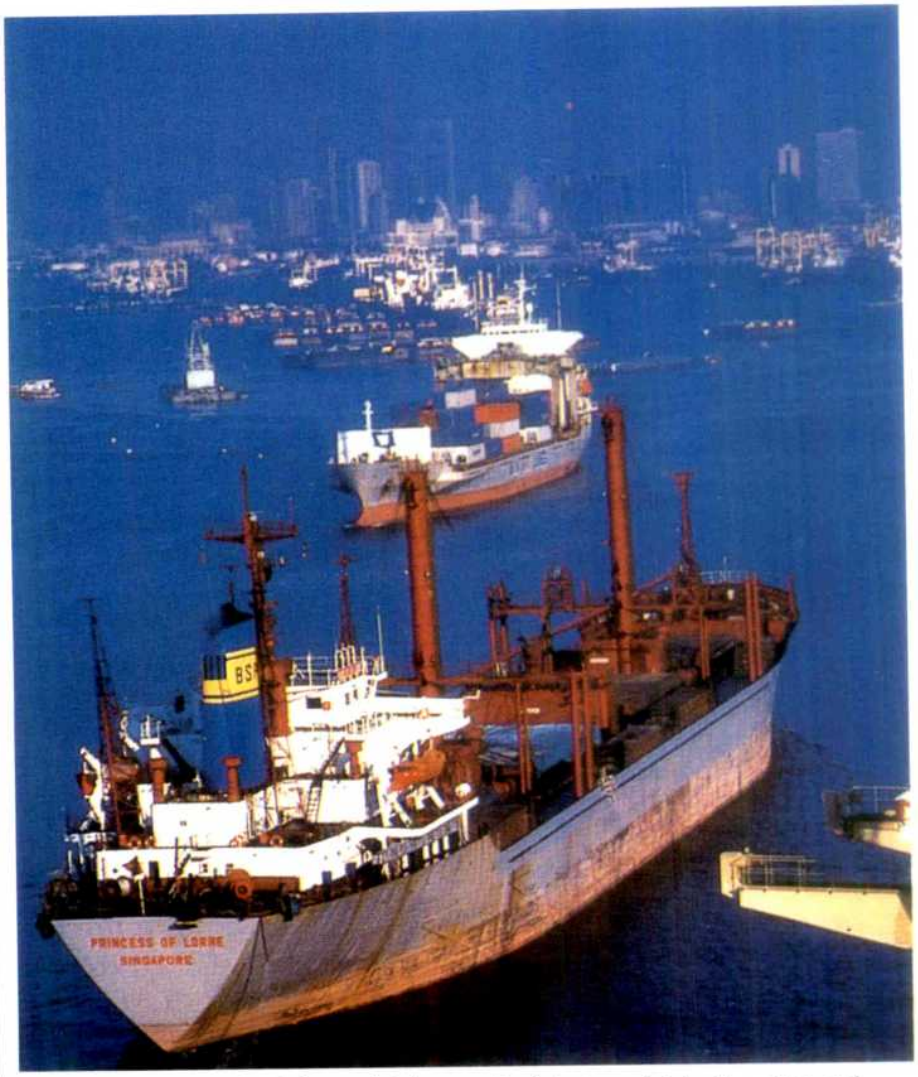
[2] **Chew, Hillary.** 1999. Technology Designed to Curb Harmful Migration of Marine Organisms: *System for Sterile Ballast, The Star: Maritime Section.* August 1999.

[3] Information in this section is mostly taken from the report of "Ballast Water Treatment Systems: A Feasibility Study" by Debra Greenman, Kevin Mullen, and Shardool Palmer, a project commissioned by the United States Coast Guard and Worchester Polytechnic Institute.

Introduction of Exotic Species through Ballast Water Discharges

How does the species of one country get introduced to another country through ballast water? When an international ship sails from a certain country with no cargo, the ship pumps in seawater to compensate the weight lost. Once it reaches its destination, the ballast is then discharged as the ship is loaded. Often, the ballast discharge will release foreign species from seawater taken from the port of departure of the vessel concerned.

The technical report done by Australia's Centre for Research on Introduced Marine Pests (CRIMP) suggested a number of parameters that will determine the degree of colonisation by the introduced species. Berths or relatively narrow shipping channels increase the probability of colonisation because the opportunities of dispersal are limited. Activities at ports may also enhance the success rate of colonisation because of alteration of the habitat or degradation, on account of which the natural community may be outnumbered by the invaders. The problem is further compounded as these exotic species are then spread domestically by coastal vessels.



Ballast water, loaded at a ship's port of origin to maintain the safety and stability of the ship, can introduce harmful aquatic organisms when discharged at the port of destination.

Examples of Impact of Invading Species on Local Environments

The invaders that are introduced via ballast water discharge include marine pests/organisms and micro-organisms that have great potential for damaging the ecosystem. Most global extinction due to invasive species has always been associated with islands or aquatic ecosystems and not terrestrial or continental ecosystems.[4] Thus, Article 196 of the United Nations Law of the Sea Convention acknowledges that necessary measures should be taken by all States to prevent, reduce and control either intentional or accidental introduction of alien or new species that may cause harmful or significant changes to the marine environment.[5]

There are many examples of the damage caused by bio-invasion or biological pollution of ballast water. One appalling example is the dominance of comb jelly in the Black Sea that eats the zooplankton, which is an important source of nourishment for fish. This has led to the crash of several marine fisheries in the Black Sea. The exotic phytoplankton from ship ballast water also poses threats to mariculture sites on Canada's East Coast. The black-striped mussels have caused fouling of wharves, marinas, recreational and inshore vessels, marine farms, and mariculture pumping facilities in Australia that cost million of dollars for remedial and infrastructure repair. Ballast water is also responsible for the spread of cholera which was found in the ballast water of vessels from South America entering the US.

Some very high-profile invaders, such as the Round Goby (*Neogobius melanostomus*), Zebra Mussel (*Dreissena polymorpha*), Ruffee (*Gymnocephalus cernuus*) and Spiny Water Flea (*Bythotrephes cederstroemi*) are some of the identified exotic species of the Great Lakes that entered the area through ballast water discharges and are known to cause economic and environmental threats. The Round Goby, a bottom-dwelling fish, competes with native bottom-dwellers like sculpins and log perch. With its frequent spawning and its aggressive behaviour, the species could threaten the existence of the native species. In Australia, some of the identified invaders are like the Northern Pacific Seastar (*Asterias amurensis*) and dinoflagellate alga *Gymnodinium catenatum*. Table 1 is a list provided by CRIMP of known or likely exotic marine species in Australian waters that are possibly brought in via ballast water.

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[4] **Heywood, V.H. ed.** 1995. Global Biodiversity Assessment, *Cambridge University Press, Great Britain.* It is published for the United Nations Environment Programme.

[5] **Moyle, P.B.** 1995. Ballast Water Introductions, *American Fisheries Society, USA.*

Ballast Water Management in Malaysia – A Status Overview

In Malaysia, ballast water is a subject that has not been studied or fully highlighted. This means there is a complete absence of information on the problems associated with the discharge of ballast water. The first step towards understanding the magnitude of the ballast water problem in Malaysia is therefore to fill the information gap in two areas – local marine biological diversity and possible introduction of species associated with ballast water. At present, no analysis has been carried out on this. This will mean problems in assessing the impact of ballast water on Malaysia's marine biological diversity.

The next step is to conduct ballast water sampling. Ballast water sampling and analyses are rudimentary steps before a risk assessment – which is defined as an estimate of damage caused by unwanted circumstances or agents and the consequences of that damage.[6] The species inventory and the risk assessment analysis will assist towards communicating and formulating appropriate policy and management strategies.

Another area that needs to be looked into concurrently is the management of ballast water discharge in Malaysia. No effort has been made towards formulating guidelines and gazetting rules specifically for controlling ballast water discharges. Malaysian provisions such as the Environmental Quality Act and the Federation Port Rules will only be applied if the ballast water contains oil residue. Given ample evidence of problems caused by ballast water, it is important to learn the magnitude of the problem in Malaysia and to act upon it, since ballast water is by far the commonest vector of exotic species introduced.

Addressing the ballast water discharge issue is essential to protect and conserve Malaysia's marine biological diversity. Invasion by alien species could result in a dramatic, irreversible and prominent change in the ecosystems or the ecosystem process. Furthermore, Malaysia would also be fulfilling her international obligations under international treaties such as MARPOL 73/78 and the Convention on Biological Diversity.

Species Sampling

There are many species groups that could survive in ballast water, ranging from large organisms that are usually in their planktonic life stage to bacteria and viruses.[7] This section provides a conceptual idea of sampling and gathering information on alien species associated with ballast water. The 'how to do' outline given here is not exhaustive.

The first step in identifying potential aquatic invaders is to identify the potential geographic donor regions on the basis of several criteria.[8] It was suggested that geographic realms with similar climates are likely to have greater potential for successful exchange of species. By analysing the country's shipping pattern, the possible donor regions could be singled out for survey of organisms in their incoming vessels. It was hypothesized that regions with growing economies are potentially accountable for transporting aquatic plants and animals around the world. Specific data could be gathered from the identified vessels such as the frequency of vessel visits, ballast quantities discharged and the physical nature of the ballast.[9] Such information is required in order to evaluate the effectiveness of ballast water regulations should voluntary control measures be introduced in the country.

To characterise the density and diversity of ballast water organisms, samples could be collected from vessels arriving at ports using the plankton net. According to a technical report entitled *A Review and Evaluation of Ballast Water Sampling Protocols,* net sampling through manholes is normally preferred over other sampling methods because it eases and speeds up the sampling process. However, this technique is appropriate only for full cargo holds and wing tanks. The report mentioned some other sampling techniques such as sampling with pumps using sounding pipes or air vents. These techniques have their own strengths and weaknesses. The good side of it would be that they provide access to a greater range of tanks. Unfortunately, sampling with pumps requires more cumbersome equipment and longer sampling duration. It can only be used when ballast pumps are in operation. Practicality and effectiveness are the keys to selection of the most suitable sampling method. It was further suggested in the article that a combination of methods should be considered to minimise the sampling bias of a single method.[10]

Ballast water from a single ship could contain hundreds of living species of phytoplankton, zooplankton, larval fish and invertebrates. At this stage, it is difficult to identify the species composition unless the samples are cultured in the laboratory. Culturing the species under a condition that is similar to Malaysian waters could also help scientists predict the species abundance.[11] In addition, it helps further analysis of species viability to adapt to their new sanctuary such as their tolerance limits and natural mechanisms for rapid dispersal.[12]

The sampling information would help in assessing the magnitude of the problem in Malaysian waters. If any of the species are detected, an unequivocal link could then be established between ballast water and the population found. Some groundwork on literature research of invasive species associated with ballast water is also useful as a basis for analysis and prediction.

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[6] **Alexander, Mike.** 1995. How Are Quarantine Risks Assessed? *New Zealand.*

[7] *Ibid.*

[8] **Ricciardi, Anthony and B. Rasmussen, Joseph.** 1998, Predicting the Identity and Impact of Future Biological Invaders: A Priority for Aquatic Resource Management, Canada. *J.Fish Aquat. Sci. Vol. 55,* pp. 1759-1760.

[9] **Hayden, Barbara.** 1995. Assessing Ballast Water Volumes, Origins and Content of Ballast Water, *New Zealand.*

[10] **A.Sutton, Caroline, Kate Murphy, Richard B. Martin and Chad. L. Hewitt.** 1998. A Review and Evaluation of Ballast Water Sampling Protocols, *Technical Report #18, Tasmania, Australia.*

[11] **Ruiz, Greg.** The Aliens Among Us, *On The Rhode, Newsletter of the Smithsonian Environmental Research Centre, 1994 issue.*

[12] *Op.cit.,* **Anthony Ricciardi and Joseph B. Rasmussen.** p. 1761.

Table 1

Known or Likely Exotic Species in Australian Waters: Probable Origin and Reported Distribution

Phylum	***Class/Order***	***Genus***	***Species***	***Probable Origin***
Annelida	Polychaeta	*Boccardia*	*proboscidea*	N Pacific
		Euchone	*sp*	Unknown
		Hydroides	*elegans*	Europe
		Mercierella	*enigmatica*	Mediterranean, Europe
		Polydora	*ciliata*	Europe
		Pseudopolydora	*paucibranchiata*	N Pacific
Arthopoda	Cirripedia	*Balanus*	*improvisus*	N Atlantic
	Decapoda	*Palaemon*	*macrodactylus*	Japan, China, Korea
		Pyromaia	*tuberculata*	N E Pacific
		Rhithropanopeus	*harisii*	N W Atlantic
	Mysidacca	*Neomysis*	*Japonica*	Japan
Chordata	Ascidiacea	*Ascidiella*	*aspersa*	N Europe
	Pisces	*Acanthogobius*	*flavimanus*	Japan, Korea, China
		Forsterygion	*varium*	New Zealand
		Lateolabrax	*japonicus*	Japan, Korea, China, Taiwan
		Sparidentex	*hasta*	Arabian Gulf
		Tridentiger	*Trigonocephalus*	Japan, Korea, China
		Trisco	*dermopterus*	W Pacific-equatorial
Echinodermata	Asteroidea	*Astrostole*	*scabra*	New Zealand
Ectoprocta	Cheilostomata	*Membranipora*	*membranacea*	N Atlantic, cosmopolitan
Mollusca	Bivalvia	*Corbula*	*gibba*	S E Asia
		Crassostrea	*gigas*	Japan
		Musculista	*senhousia*	NW Atlantic
		Perna	*canaliculatis*	New Zealand
		Soletellina	*donacioides*	New Zealand
		Tapes	*Japonica*	Japan, Philippines
		Theora	*lubrica*	N W Pacific
		Venerupis	*largillierti*	New Zealand

Cyanide Fishing, Tubbataha Reefs and the Chinese Connection*

by Vic Milan

The author, who heads a marine conservation NGO in the Philippines, discusses the pernicious practice of the use of cyanide to catch fish live, which can kill entire coral reefs and destroy the fish habitat. He urges environmental activists to keep up their struggle to save the environment. "If we stop trying, all hope will truly be lost."

In a plush upmarket Hongkong restaurant one pleasant evening, a visiting businessman and his wife are treated by their local host to what is planned to be an unforgettable meal. The main course is a dish of green grouper – garnished with spring onions, fine strips of ginger, steamed, then doused with soy sauce. In the few seconds just before serving, the chef carefully pours hot boiling oil over the garnishing and there is a delicious crackle while the oil penetrates the soft and delicate meat. A mouth-watering aroma fills the air.

The other ritual that was intended to make a lasting impression on the guests was that they were allowed to pick the fish themselves, from several that were alive and swimming in a glass display tank.

One can visualise the host explaining to his guests the advantages in taste and flavour of fresh – they can't come any fresher than alive – grouper or wrasse, both coral reef food fish. Depending on the mood of the moment, he may even suggest aphrodisiac attributes to the evening's *piece de resistance*. Ventral fins are erect and firm only in live fish, you know. In a more serious tone, the Chinese host might say that live fish promotes speedy recovery for convalescing patients and nursing new mothers.

But what's the connection between this innocent business scene in Hongkong and my concerns as head of the Tubbataha Foundation, a marine conservation NGO in the Philippines?

Allow me, ladies and gentlemen, to take you on a fast trip to the Philippines, two hours by jet southeast of here. Mine is a nation of 7,000 islands, home to 65 million people who can somehow manage to maintain a rather laid-back lifestyle, who can smile through coup and coup attempts, roaring typhoons, rampaging floods and violent volcanic eruptions.

The Philippine archipelago lies in the "Fertile Triangle". Four diversity studies since 1954 showed that this triangle possesses the most diverse marine biota of the world. Over 2,200 fish, over 3,200 molluses, 488 species of coral in 78 genera, and 971 species of benthic algae in 209 genera, are found in the Philippines, mostly in the coral reefs. The fate of the Philippines' coral reefs is a planetary concern.

What and Where is Tubbataha?

Tubbataha is from two Muslim words, Tubba and Taha. Tubba is for long, and Taha for shore, or reefs, or lagoon.

Tubbataha Reefs is in the middle of the vast Sulu Sea. Thirty-three thousand hectares of one of the most fabulous coral reefs in the world. Home to hundreds of species of both food fish and exotic tropical aquarium fish. Home to

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* *Talk delivered at the Conference on "Trade & The Environment in Pacific Rim Nations" organised by the American Bar Association at the New World Harbor View Hotel, February 15-17, 1993, Hong Kong. Reproduced from* Coastal Management in Tropical Asia, *September 1993.*

hawksbill and green turtles, and to boobies and terns, and 44 other species of birds (including occasional warblers vacationing from the freezing cold of the Russian tundra).

It is now known as the Tubbataha Reefs National Marine Park, the first and the only national marine park in my country (now being considered for declaration as a World Heritage Site).

Flashback: Just a little over three years ago, we waged a fierce battle with a big and influential Filipino company that is the world's fourth largest processor and exporter of seaweed products. Shemberg Marketing Corporation, based in Cebu in central Philippines, had started a seaweed farm within the Park – in violation of provisions in a 1988 Presidential Decree declaring Tubbataha a protected area and national park. The provincial governor of Palawan, unbelievably, chose to side with Shemberg. As President of the Tubbataha Foundation, I assisted the fight in public forums and in both print and media to evict the park violators.

There are friends today who insist that I almost became my country's Chico Mendez (the Brazilian environmentalist who had incurred the ire of those who wished to continue raping the Brazilian rain forest). I did receive a few death threats.

But after about a year of the highly publicised skirmishes, we won an eviction order from the Department of Environment and Natural Resources – which Shemberg and the Palawan governor brazenly ignored. When another similar eviction order was laughed at, we persuaded the government to deputise the Tubbataha Foundation to assist in the law enforcement effort. One day soon after, I had the pleasure of torching the makeshift structures.

But tranquility, as it turned out, was to be an elusive dream for the marine and wildlife of Tubbataha. Our inadequately funded and equipped patrol operation reported poaching activities by both local and foreign vessels. Their priority activity – because it is the most profitable – is catching live groupers and wrasses to supply the demand from Chinese buyers in Hongkong, Taiwan and now, we are told, China.

So what is so bad about catching live fish? It is not so much that catching fish in commercial volumes is *verboten* in Tubbataha. They're using sodium cyanide, drums and drums of it, to catch live fish in Tubbataha and other formerly super-rich fishing areas of Palawan and the Sulu Sea.

I think there is no need for me to elaborate on the high toxicity of cyanide. One form of capital punishment is administered by releasing a pellet of cyanide into a pail of water under the condemned man's seat. The resulting fumes that rise paralyse the central nerves of the convict and he is dead in seconds.

I think I know what you're thinking. How then is cyanide used to catch fish alive?

A solution of sodium cyanide crystals dissolved in water is squirted into the coral resting nooks of tropical and food fish. The fish is knocked unconscious. But transferred to a tank of clean seawater, it revives. And unless it got a truly lethal dose, it survives days in a fishing vessel's seawater wells, the long journey by air and sea (sometimes just by sea all the way from Palawan waters to the harbours of Hongkong or Kaoshiung), and the days it has to stay on display in the classy restaurant until it catches the fancy of a well-heeled diner.

Allow me to shock you with a few innocent looking statistics: In 1991 alone, 3,566,000 kg of sodium cyanide were brought into the Philippines by companies supplying mining and farming operations. That's enough cyanide to gas all 65 million people in my country. The figure was even higher in 1992, 3,993,000 kg.

We now know that a good part of these otherwise legal shipments found their way to the illegal fishing sector. How much, we are still attempting to establish. The volume of smuggled sodium cyanide, plus those brought in illegally by foreign fishing vessels, is another story.

Fresh, but dead, grouper in Manila you can have for $5 to $8 per kilo. Do you know how much the Manila-based exporter of live grouper or wrasse pays the Filipino live fish trader? As of the time I left the Philippines, which was just a few days ago, traders were selling to Manila exporters at US$ 70 per kilo!

Is it any wonder that traders are bringing into my country sodium cyanide by the ton, that foreign vessels are sneaking into Philippine waters bringing their own supplies of sodium cyanide for their network of local fishermen cohorts – sometimes with the connivance of politicians and law enforcement officials?

Three weeks ago my office received a reported rumour that about 100 drums of sodium cyanide had been shipped out of Hongkong and were supposedly destined for Papua New Guinea where fishermen were to be taught how to use the deadly cargo to catch live fish. My God, I thought, have they finished with the Philippines so that they are now trying greener pastures?

Food fish is but one target of sodium cyanide users. Tropical fish, in demand by pet shops and pet shop suppliers in the United States and Europe, and now, I'm told, in Taiwan, is another lucrative international trade that is, knowingly or not – more knowingly than not – causing havoc on our coral reefs, the natural habitat of both food and tropical aquarium fish.

So what's the problem, over-harvesting? That is but one of the serious problems. One short contact with the sodium cyanide solution and corals die. No corals, no fish habitat, no fish. And it may take decades for a coral reef killed by cyanide to regain just 50% of its former pristine glory.

I have no quarrel with the businessman or his family in Hongkong, or in Taiwan, or in China who can afford the price of live Philippine fish. The reasons for wanting the fish not just fresh but alive could be cultural, and I respect that.

But when it means, that we might lose, as we are now in danger of losing, the Tubbataha Reefs, that we lose, as we have already lost, many of our other coral reef communities, I think we have good reason to raise the alarm, as I now do before this forum.

In preparation for this piece, I went through a report on the subject by Dr. Vaughan Pratt of the International

Marine Life Alliance. Here are some highlights:

- Philippine coral reefs produce three to 37 metric tons of fish per year per square kilometer.
- Destruction of coral reefs is a major contributor to poverty in coastal communities.
- Five million Filipinos are deficient in protein, vitamins and minerals which could have been derived from seafood.
- Less than 1% of those arrested (for using cyanide and dynamite) are convicted.
- Coral colonies killed by cyanide DO NOT regenerate.
- 160 million kilograms of fish worth US$8 million are lost annually due to coral reef destruction.
- Industries that also suffer because of coral reef destruction include commercial food fishing, aquarium fish, sport scuba diving and tourism.
- High prices are asked by the aquarium and shell traders for certain species which have approached or reached the categories of rare, threatened or even endangered species.
- "The fate of the Philippine coral reefs is a planetary concern".

We in the Philippines have no quarrel with the businessman in Hong Kong who only desires to give his guests a memorable dinner treat. He obviously can afford it. And so do our Chinese neighbours who believe, perhaps as part of their culture, that live fish is for good eating, good health, long life, or even a lively sex life.

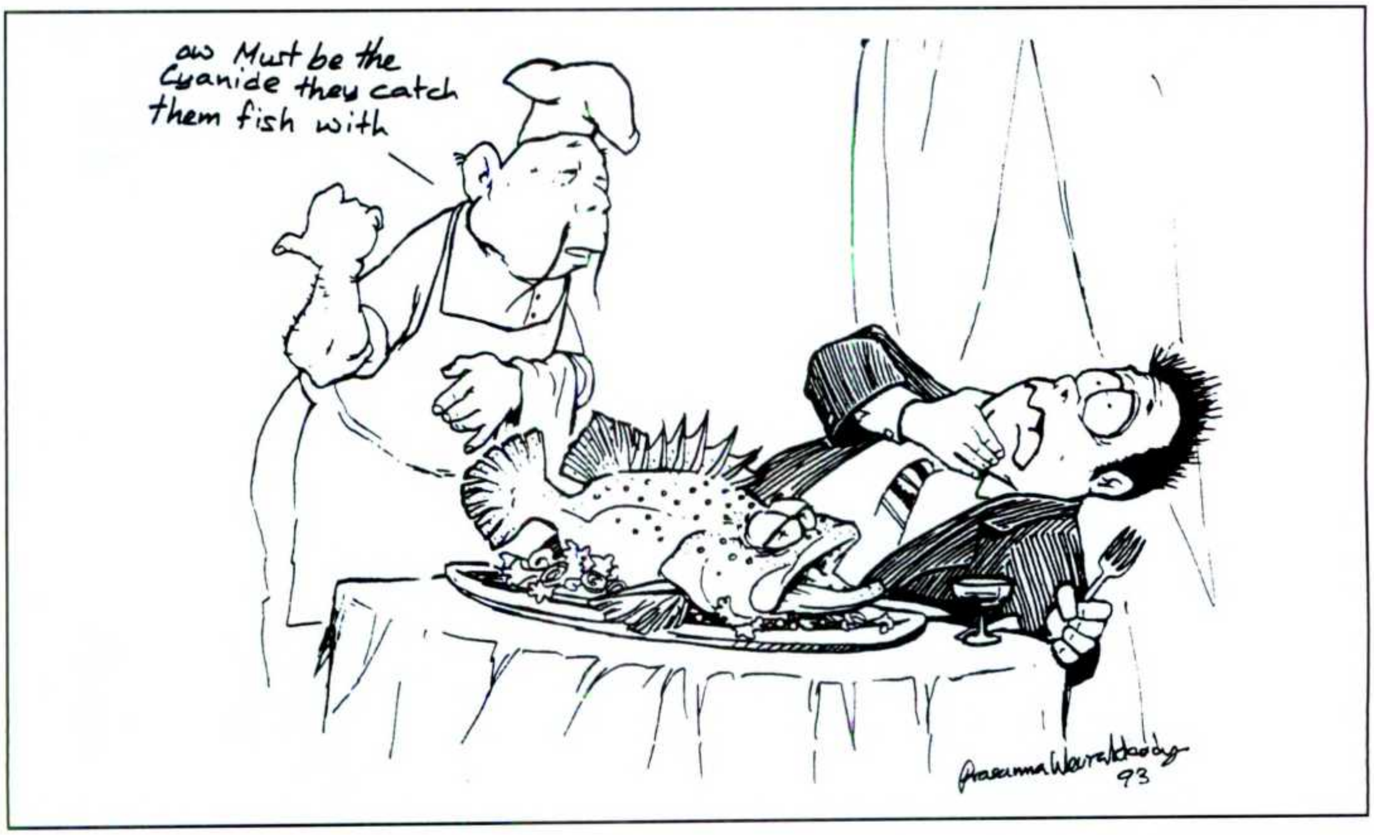
But we also think that if this active and obviously profitable trade in live fish directly contributes to the annihilation of our coral reefs, affecting our coastal fishermen, and our still developing ecotourism industry, we have to put up our collective hands and say – Stop! You are killing the goose, and it is our goose that lays the eggs that we cannot even afford to buy, because you want all of it.

The City of Puerto Princesa, in Palawan, recently passed a law banning the export of all live fish. Two other townships in the province of Palawan followed suit. The ordinances are now under review by the provincial board. The live fish exporters, understandably, are not celebrating. Now the lawyers of Philippine Airlines are formally opposing the forthcoming ban. And the Philippine Airlines station area manager in Palawan is spreading the word that his company is now seriously considering changing the flight schedule to the night hours to inconvenience the citizens, and to eventually downgrade the service from 737 jets to the smaller capacity turbo prop Fokkers ... all this in retaliation against the city's ban that will mean a loss of 11 million pesos monthly in cargo revenues from live fish traders.

Increase in trade is good. But often times it gets to a point when something's gotta give. In the case I have just discussed, what is giving, and going rather fast, are our marine resources, our health, our future, our very lives.

In my work as an environmental activist, I have often stopped to ask, "Are we in the activist NGO community, are our long hours and our cries in the media, in various fora, in international conferences such as this ... are we making a difference?"

We do not know for certain if we are making a difference. All we know is that if we stop trying, all hope will truly be lost.


aw Must be the Cyanide they catch them fish with
Prasanna Weerakkody 93

Points of View: "Putting Fisheries Management Back in Places"

by Daniel Pauly

An eminent fisheries biologist makes a few predictions about the future of fisheries management. Despite negative trends, he believes that "we humans will, in the next millennium, find ways to match our numbers and our demands with what our planet can provide." But it will be essential to "rediscover places for fisheries management".

Except, miraculously, for Jules Verne's, scientific predictions always turn out to be wrong. However, the 3rd millennium is coming, fisheries resources are going, and it is impossible to resist the urge to take the plunge and make a few predictions about the future of fisheries management, and of the scientific discipline. And no, the 's' at the end of the title is not out of place: I shall suggest that in the future, fisheries management and its associated science will have to deal with 'places' far more than they have in the recent past. Indeed, I shall suggest that they will have to return, in many cases, to ancient modes of allocating fisheries resources to local communities, rooted in physical places.

The trend now is going somewhere else, toward privatisation of fisheries resources through Individual Transferable Quotas (ITQs) and similar instruments (Pauly, 1996), and there are also attempts to privatise the research scientists and the detailed assessment work that these instruments require (see e.g. Annala, 1996, and other contributions in Munro and Pitcher, 1996). However, this trend will crest when it is realised that, while eminently compatible with the acquisitive mood of our times, self-interested exploitation schemes do not resolve, any more than the open-access schemes they might replace, the basic discrepancy between human and natural time scales.

Many fisheries resource species, e.g. demersal fish in temperate waters and large predators on coral reefs, are long-lived, with natural mortalities of 0.1 – 0.2 year^{-1}, and often less (Pauly, 1980). This implies that, for exploitation to be sustainable, fishing must not extract more than about 10% of the stock biomass per year, especially in data-sparse situations (Walters and Pearse, 1996). Even such low level of fishing mortality is sufficient, however, to quickly remove accumulations of large, old females – the source of most of the eggs and subsequent recruitment to stocks of long-lived fishes. This is so because the relationship between fish size and egg production is highly non-linear, with large females being far more fecund than an equivalent weight of small ones. Indeed, this non-linearity is so pronounced that for example one single ripe female red snapper, *Lutjanus campecheanus,* of 61 cm and 12.5 kg, contains the same number of eggs (9 300 000) as 212 females of 42 cm and 1.1 kg each (Bohnsack, 1990).

The massive reduction of egg production, relative to unexploited stocks, coincident with the removal of such females, that occurs even when a very low fishing mortality is applied, is one of the reasons why exploited stocks fluctuate as much as they do, notwithstanding the effect of environmental fluctuations (Hutchings and Myers, 1994; Myers et al., 1995). F.I. Baranov, one of the founders of fisheries science, was perhaps the first to realise that "by reducing the fish population, fishing itself provides the increment which, in turn, sustains the fishery" (Baranov, 1927). Let's not wait too long to admit that, similarly, fisheries also generate many of the fluctuations that beset fisheries, all the way to the occasional collapse – the ultimate fluctuation.

Further, even low fishing mortalities, when applied with a gear such as a bottom trawl, will have profound effects on the habitats of demersal fish species, notably by eroding often century-old bottom structures such as 'oyster reefs', sponge communities (e.g. of *Poterion* in Southeast Asia) and other beds of sessile, filtering organisms. The result is increased water turbidity, and a gradual transition, within coastal ecosystems, from a demersal to a pelagic food web – a very common type of transition (Pauly, 1988, provides a case study). A similar process occurs when coral reefs are stressed, except that the primary production, previously fuelling their repair and growth, tends to end up in filamentous green algae, and in whatever can eat those.

Thus, my contention is that even very low rates of fishing mortality are unsustainable in demersal stocks unless a sizeable fraction of their spawning adults are completely inaccessible, owing to some natural refuge (underwater canyons, large boulders, etc.). These refuges are, should I mention it, the very spots which good fishers must discover and drain if they are to maintain high individual catches and their reputation – whatever the average level of fishing mortality. But can we reconcile the vastly different time scales of humans and fish, and of benthic communities? Not through application of 'optimal' rates of fishing over large areas, however detailed the studies that led to their estimation. Rather, these different time scales require new refuges – marine reserve areas (MRAs) – providing shelter to a wide variety of species, including major commercial species thus protected from the ultimate fluctuation (see page 5-6).

For this to work, though, there must be agreement not to fish in certain places,

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which can happen only if those who do not fish within the MRAs accept their rationale, and benefit from their existence, i.e. if a sense of place re-emerges within fishing communities, as they become the local guardian of the resources and not their roving executioners. Such agreement may emerge if our science continues to confirm that suitably placed and suitably sized MRAs will perform for us what is expected of them (see Roberts *et al.*, 1995, for an attempt at a consensus statement). And, perhaps not surprisingly, given the wide scope of their sizes, ideas implicit in Beverton and Holt's classic, or explicitly dealing with MRAs, because yes, they also dealt with those (see pp. 365-368 of their 1957 book, either in the original, or the reprinted versions, and Pauly, 1993).

Though sometimes tempted by pessimism, I believe that we humans will, in the next millennium, find ways to match our numbers and our demands with what our planet can provide (this is not so for the time being). This will require that we abandon rape and pillage as our major mode of interaction with natural resource. For fisheries, it will require rediscovering places for fisheries management.

April 22, 2000 – 30th anniversary of Earth Day

Five hundred million people and thousands of organizations from all the continents will unite on April 22, 2000 – the 30th anniversary of Earth Day – and make it "the largest and most effective environmental event in history".

Working with citiziens from every nation on earth, the Earth Day Worldwide Network is using grassroots organisations and Internet to plan events and programmes, compare problems, share solutions, build an ever-deepening knowledge base and empower even the remotest citizen. The Network plans to unite "pro-environmental forces" to educate, empower and inspire actions the protect the earth.

"Everyone who participates in Earth Day 2000 is a force for change," says the network. "Each individual's voice added to the cause strengthens the possibility that the call for change, will be heard and acted upon." The network's website www.earthday net contains details of events planned in every country.

- In the Philippines, a massive environmental concert for youth will be broadcast live all across Asia.
- In Mexico, 30,000 high-school students will plant trees in the capital.
- In Ghana, a 3-day workshop will teach skills in natural resource conservation to women and youth.
- In the U.S., movie star Leonardo diCaprio will lead a huge rally at the Mall in Washington D.C. He will wear a specially designed Earth Day T-shirt.

The network urges the youth of the world of "find out what is happening in your country for Earth Day 2000". "Organise an event in your community, school or business. Attend an event – or help some one else who is organising an event. Pass this message on to a friend or colleague."

The first Earth Day was organised in the United States on April 22, 1970. Twenty million citizens came together for the event. Their collective effort forged the creation of the main environmental agency in the U.S., as well as the nation's first serious laws on clean air, clean water and protection of endangered species.

The first global Earth Day was organised 10 years ago – on April 22, 1990. This time 200 million people took part. That international groundswell contributed to the success of the first Earth Summit held in Rio de Janeiro, one of the biggest and most publicised events in history. It also led to the establishment of environmental protection agencies in many countries.

"Earth Day 2000 will harness 30 years of commitment and momentum to create a united global voice for a hopeful planet-wide sustainable future," says the network. "Join us today"!

The Earth Day Worldwide Network is located at
91 Marlon Street, Seattle, WA 98104, USA. Tel: 1.206.876.2000. Fax: 1.206.682.1184.
e-mail: worldwide@earthday.net

BAY OF
BENGAL
NEWS

Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional multi-agency fisheries programme which covers seven countries around the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The programme plays a catalytic and consultative role: it develops, demonstrates and promotes new methodologies, techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in the member countries. The BOBP is sponsored by the governments of Denmark and Japan, and by member governments in the Bay of Bengal region. The main executing agency is the FAO (Food and Agriculture Organization of the United Nations)

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BAY OF BENGAL NEWS

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Perspectives on shrimp culture

This issue carries three thoughtful articles on aquaculture, focusing on shrimp culture: a global overview, an assessment of shrimp culture in India, and a demolition of myths about farmed seafood. The last article (by the Global Aquaculture Alliance) recalls Peter Drucker's remark that fish farming, not Internet, is one of the new century's most exciting industries. In sum: there's no alternative to aquaculture as a source of seafood; and governments and shrimp farmers should ensure that shrimp culture practices become systematic, eco-friendly and socially responsible.

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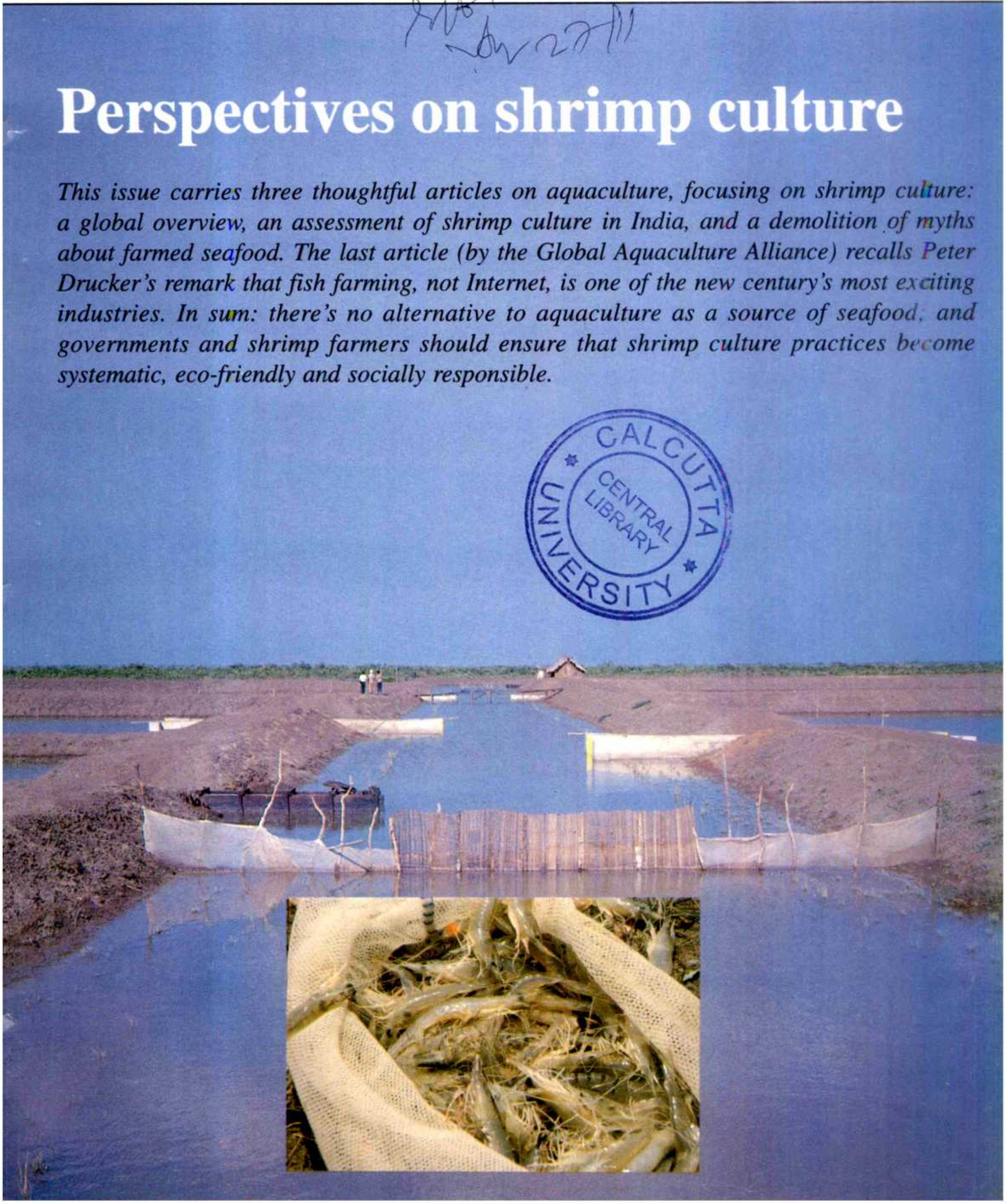


Breaking the *Us* vs *Them* Divide

Competition and conflict are inevitable in human affairs. The history of humankind is replete with human conflict. Even in the animal kingdom, competition – for space, for food, for a mating partner – is rife. In fact, competition and conflict are about the only human endeavours that can be described as sustainable! Everywhere, humans find it difficult to see eye to eye with each other, even within a family. The *Us* vs *Them* human schism often finds an entire community split into two or more hostile factions.

Why this perennial schism? Is it a curse? Is coexistence not possible? Can community conflicts be made a thing of the past? Can competition be healthy? Do numbers matter? Do greater human numbers mean worse competition and more conflicts? If so, will smaller numbers mean better resource management because of less severe competition? *Quo vadis* human unity! Is a galactic war the only way to pressure humans into unity?

Competition and conflict arise when different groups of people or individuals take sides, polarise. Polarisation occurs from differing human perceptions of events or phenomena. Differing perceptions – over interests, pursuits, causes – result from looking at things differently, different upbringing (cultural, ethnic, religious or political), exposure to different environments and contexts. When perceptions are at odds with one another, clashes or open conflicts result. Such conflicts polarise the human species.

As the second millennium comes to a close and the third begins, the *Us* vs *Them* human divide must be broken. The third millennium belongs to the people. More and more people are looking forward to, if not demanding outright, more and more empowerment and local self-governance. People are wary of the ineffectiveness of a governmental system driven from afar, the centre of power. The march to empowerment goes on, whether or not the government is willing to relinquish its authority.

There is clearly an urgent need to evolve a more **inclusive** system of human enterprise, one that brings the poor centrestage. The government is still the best institution to bring about such an inclusive system, even though it may not have succeeded in the past. As the government is constituted of the people, it has to uphold democratic principles and processes and deliver on its mandate, and give the poor a better deal.

The *Us* vs *Them* divide derives partly from the non–inclusive system of human enterprise which has evolved over time. Because of the selfish human trait of appropriation (cornering all the benefits of enterprise for themselves), of grabbing, others get excluded. Every human being wants affection and a sense of belonging, and feels alienated when he is kept out. He feels wronged, unjustly ignored. He believes he has as much right to benefit as the others. Result: polarisation. Someone's insistence on his or her right to a share of the goodies – that's what sows the seeds of discord.

Seeking redress against **exclusion** can take many forms: it can be peaceful, it can be legal, it can be confrontational. The spirit of coexistence suffers. Decency and civility break down. A breach occurs in unity and harmony. People take sides and join opposing camps. Antagonism grows and bursts into open conflict. There's no winner. All are losers.

A spirit of live and let live would make everyone a winner. But this spirit is difficult to encounter in the divisive and fractious world of today.

A flexible and enabling framework for discussion and debate is needed under which all the information is made available and various vested interests are made public. Vested interests are not bad in themselves. It is when they exclude other parties and harm others that they become anti-social and anti-community and inspire opposition. A framework of full disclosure of information and vested interests can encourage opposing parties to work out acceptable and enforceable agreements. Discussion enables a process of clarification, explanation, consensus-building, negotiation, mediation and compromise, without any one feeling compromised. The framework must also be able to integrate diverse points of view or differences of opinion, and bring knowledge and expertise to bear on resolving conflicts. Local knowledge and experience of local conditions, values, perceptions and attitudes can improve understanding of the conflict-resolution process.

At the other extreme, people have been known to cleverly use information or keep information away from others to advance their own interests and further their own causes. The power of information to build and arouse awareness is potent. It can highlight differences in perceptions and expose everyone's ultimate motives or aspirations. Once articulated and highlighted, all aspirations may reveal common ground. Particularly today when every person young or old aspires to a cleaner and more secure environment, more sustainability, more responsible consumption, more responsible resource exploitation and management, more vigorous conservation and protection to ensure environmental security. Differences in perceptions are often merely the result of misinformation and manipulation. (See *Bay of Bengal News* September, 1998, p 19-21).

Misinformation – keeping information away from the have-nots – is a form of communication mischief. This has been at the root of human problems. Misinformation is resorted to because of a vested interest in the *status quo*. People who are born into privilege or who have acquired it by means fair or foul, are not prepared to give it up. They will fight hard to retain it. But such an attitude **must** change if we are to break the *Us* vs *Them* divide which has not served any purpose other than bringing human insecurity upon all. We are in it together.

The work carried out by the member countries of the Bay of Bengal Programme such as stakeholder consultation, analysis, implementation and engagement is a small effort to institutionalise a more inclusive system of resource management of their natural resources.

– Kee-Chai CHONG

Networking for Environmental Sustainability

by Kee-Chai CHONG

If you collect enough dust, you can make a mountain
Japanese Proverb (Source: Ando 1995)

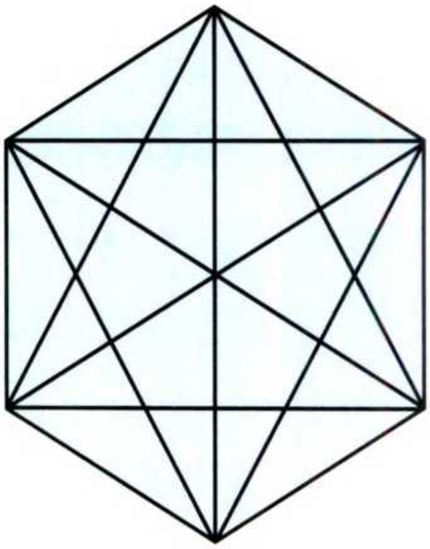
No man is an island. Human beings are social and communal. But they have so far used this trait for narrow purposesto advance racial, religious or sectarian interests rather than that of society as a whole. Result: the world is being increasingly polarised. The *Us* vs *Them* syndrome is getting accentuated. (See page 2).

When human numbers are few and resources abundant, there is enough of everything. Competition is sparse. But when numbers grow and resource scarcity becomes acute, the spirit of co-operation vanishes. Competition begins, confrontation sets in. The spirit of sharing comes under increasing strain. This spirit of sharing and caring has to be revived.

Down the ages, human beings have not been able to institutionalise a system of governance that is all-inclusive. Democratic may be, but all-inclusive? Not yet! An inclusive governance system would bring people together and integrate interests and concerns. But it is a divisive non-inclusive framework of governance that exists everywhere. It excludes rather than includes people. Many of our present-day systems of governance continue to exclude people, especially the poor.

New Answers to Old Problems

Management and conservation are not the sole responsibility of government. Nor of the experts only! They should be the daily concern of people who rely on nature for their livelihood, their food, their income. The way natural resources are used by people, the way they are governed and managed, must change in response to growing resource scarcity. Materialism and consumerism on the one hand, and growing poverty on the other, have only intensified the demand for scarce resources.



Poverty has not declined despite the many breakthroughs in science and technology; it has only deepened and widened. New answers must be summoned to address this problem, and that of the unsustainable use of natural resources. Today, more than a third of the world population, some two billion people, have to make do with about two US dollars a day. What is vitally needed is a political breakthrough; it has to be driven by self-empowerment, which in turn calls for **networking.**

Humans can no longer continue to take from Nature without giving back something to it. New relationships have to be forged between humans on the one hand, and the environment and natural resources on the other. These new relationships must emphasise sustainability at any costs. Sustainability must become a way of life.

Humans must sacrifice short-term gain and material comfort for long-term sustainability. As the dominant stakeholders of Mother Earth, they must be sensitised to sustainability, Such a stakeholder orientation is long overdue. As people become better informed, they will become more aware of their responsibility to one another and to Mother Earth.

Participatory Pro-Poor Inclusive System of Self-Governance

The second millenium has ended; the third millennium should belong to the people. People everywhere are looking forward to local self-governance, if not demanding it outright. They are wary of a governmental system driven from afar. The march to empowerment is growing – whether or not the government is willing to recognise the fact.

There is clearly an urgent need to evolve a "more inclusive" system of human enterprise, one that responds to the needs of the poor. Even with its shortcomings, the government remains the best institution to bring about such an inclusive system. As the government is constituted by the people, it has to uphold democratic principles and processes. Besides, governments are expected to carry out the will of the people! More important, the government must keep the people informed and not withhold information from them. A better informed public will be able to question decisions made that affect them and their community. This is because information not only increases awareness but improves understanding. Information also creates and builds accountability, and thus compels action. Once you are aware of the information, you may be held accountable.

Redressing the problem of exclusion, especially of the poor, can take many forms: awareness-building and government intervention, legal processes or the confrontational process. So far, it is mainly the confrontational process that has been in evidence: tenants vs landlords, labour vs management, large-scale vs small-scale, artisanal vs commercial, poor vs rich, haves vs have-nots, we vs they. Nobody wins in a confrontation, peaceful, legal or otherwise. A philosophy of live and let live benefits all people, all stakeholders. But this lesson has not been learned and put into practice.

Networking: A Framework for Mass Movement in Resource Management

Responsible human behaviour has never been automatic. People rarely fall in line to comply with responsible behaviour, especially in the public domain. They bring self-inflicted destruction upon themselves. People should instead capitalise on their natural conservationist and protectionist instincts.

A flexible and enabling framework is needed for discussion and debate, with all the information made available and vested interests laid bare for closer examination. Vested interests by themselves are not necessary bad. It is when they exclude others, such as the poor or the have-nots, that they should be opposed or resisted. A framework for information-sharing, with full disclosure of information, will encourage opposing parties to come together and work out acceptable and binding or enforceable agreements.

Discussion enables a process of clarification, explanation, even reasoned disagreement, consensus-building, negotiation, mediation and the acceptance of compromises. The framework must also be able to integrate diverse points of view or differences of opinion and bring available knowledge and expertise to bring to bear on resolving conflicts. Local knowledge and experiences of local conditions, values, perceptions and attitudes can improve understanding of conflict mechanisms and resolution processes.

For fisheries and other aquatic resources, the Code of Conduct for Responsible Fisheries provides the basis and the framework for a concerted mass movement to bring about a participatory pro-poor inclusive system of integrated resources management and self-governance. Another framework is the *Codex Alimentarius.*

People have been known to cleverly use information (or keep out information) to further their own interests and causes. Information is a potent tool that can throw light on differences in perceptions and reveal the common aspirations of the community. Every person has his special perception or outlook. The key to a harmonious society lies in narrowing down such differences so that they become common aspirations. Most responsible people advocate more sustainability, more responsible consumption, more responsible resources exploitation and management, conservation and protection to ensure environmental security. Differences in perceptions occur because of misunderstanding and misinformation.

Misinformation and communication mischief have been at the root of human problems. There is an effort to keep information out of the reach of the poor – because of a vested interest in preserving the status quo. Information and knowledge should not be the monopoly of the well-connected. Information dissemination can be democratised to benefit one and all, especially the two billion poor!

For a start, networking among all stakeholders can bridge the *us* vs *them* divide. It will arouse awareness that the problems being faced are the common problems of all humankind, not just the problems of the poor. Everyone is in it together.

Management as a Mass Movement

By now, it should be obvious to all that there is no short cut to management. Human security hinges critically on sustainable use of resources and the environment. Sustainable resources use comes about only with management. There is just no way out.

It is therefore crucial that management becomes a mass responsibility with every person doing his or her share of responsible consumption. It is ultimately the level of consumption that determines the level of production, which in its turn determines the rate of sustainability of resources exploitation and use. If management is to be promoted as a mass movement, it must be accepted as a cause to be pursued with vigor, not just a "feel good" cause!

How can people's attention be drawn toward management as a cause to pursue? How can attention be drawn to what ails the environment at the local and global levels? Networking can be a good start, a first step.

NETFARM (Networking for Fisheries and Aquatic resources Management)

To succeed as a mass movement, management action at the individual and community levels must be informed by a spirit of volunteerism. Volunteerism is crucial because no person or institution, not even the government, will pay for activities to manage the global commons! People's role in management becomes vital. If volunteerism is not forthcoming, it must be developed, even coaxed out of every person, through peer pressure and community pressure.

The BOBP is in the process of activating and operationalising an FAO information network that is known as "Supporting Fisheries Management in Asia: An APFIC Information Network". For a start, networking will be limited to the BOBP's member countries.

Activities

A virtual discussion of NETFARM will soon be held on organising a national fisherfolk week in every member country. The discussion is about how awareness leads to volunteerism and in turn to action. As people become more aware of actions that harm, impair or degrade the environment, they will realise that they alone can help reverse environmental degradation. If sufficiently aroused, they will volunteer on their own to act. When each individual stops unsustainable habits, the cumulative sum of these individual actions will amount to a mass movement.

Volunteerism can start with consumer power. The consumer can send the producer economic signals through his purchasing power by buying or not buying goods and services sold in the marketplace.

Example: When consumers stop buying gravid female fish or under-sized or juvenile fish, they will send very strong signals to fisherfolk that there is no market for such fish. Middlemen will then stop buying the fish. When this happens, more fish are allowed to spawn and grow into large size, thus increasing total production.

Community spawning cages could be installed in strategic locations to encourage fisherfolk to place gravid females in them and let them spawn. The presence of such cages encourages fisherfolk to deposit gravid females there. After the spawning, the spent females are removed and sold in the market. The income from such sales boosts a revolving fund for community development. NETFARM can promote such ideas.

Shrimp Culture: A Global Overview*

By W G Yap
Aquaculture Consultant, SEAFDEC/AQD

Reviewing the status and problems concerning shrimp culture worldwide, the author says that after the feverish growth of the 1980s, shrimp farming production appears to have stabilised around the figure of one million tons. The most serious issue facing the shrimp industry is sustainability. Biological and mechanical means to lower pollution, such as use of less polluting feed, are being explored. But the soundest approach ecologically is likely to be the zero discharge system, where waste water is treated and recycled.

Showing Signs of Peaking

Greenpeace and whitespots not withstanding, the six billion dollar shrimp farming industry manages to hover at the production level it has been at since 1995 – close to one million metric tons. After a spectacular 26.4% average annual growth between 1984 and 1991, the industry managed to squeak by with a 2.2% average annual growth between 1991 and 1997. The industry appears to have reached its plateau since 1992. Although there are signs of decline, don't bet on it – the 1997 contraction was less than 1%. Meanwhile new players continue to come in and may just boost total production.

As industries go, shrimp farming is relatively new. Not counting the pioneering research work of Dr Hudinaga in the 1930s which eventually led to the development of shrimp hatchery technology, and the extensive cultures using wild seedstock, shrimp culture as an industry can be traced back only to the early 1970s. That was when interest in its culture started to perk up outside traditional growers in Southeast Asia in their age-old earthen ponds. Despite its relative newness, close to a third of world shrimp production is now made up of farmed shrimp (Figure 1).

If the production of the major farmed species is compared with that of the same species from capture fisheries, the contribution of aquaculture is found to be considerably higher. As shown in Figure 2, of the six major species being farmed, only the *Kuruma* prawn,

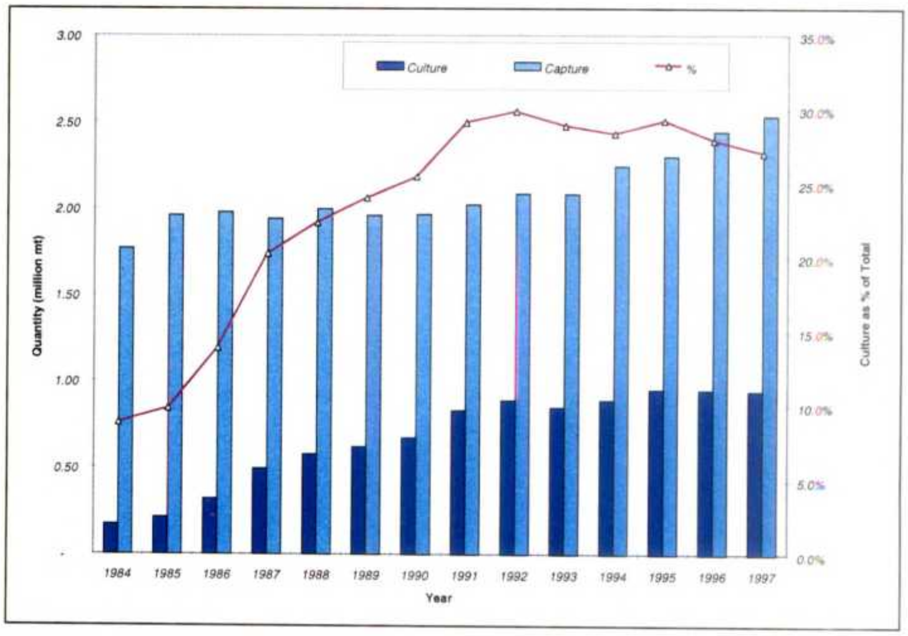


Figure 1: World production of shrimps from capture and culture showing percentage of farmed shrimps to total, 1984-1997 (Source: FAO Aquaculture Statistics)

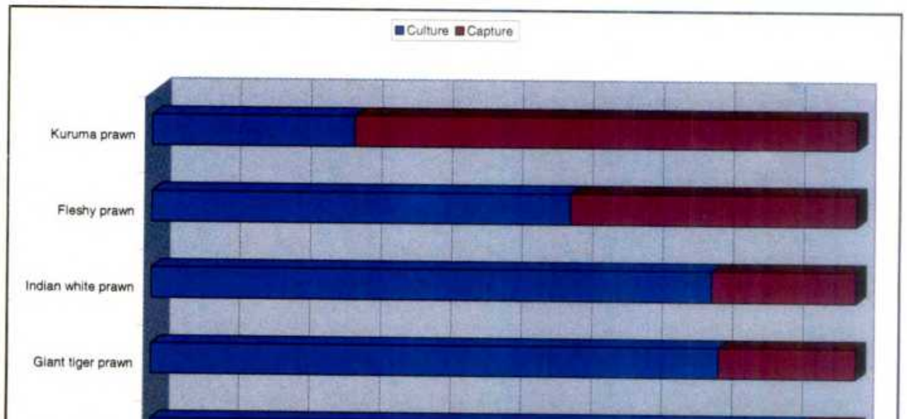


Figure 2: Percentage contribution of aquaculture and capture fisheries to the production of major penaeid shrimp species.

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Marsupenaeus japonicus, still relies more on capture fisheries than on aquaculture. On the other hand there are no entries at all of landings from capture fisheries in the FAO Fisheries Statistics of the blue shrimp, *Lithopenaeus stylirostris.*

As for the other species, farmed shrimps make up 92.6% of the total world production of whiteleg shrimps, *Litopenaeus vannamei;* 80.6% of the giant tiger prawn, *Penaeus monodon,* 79.5% of Indian white shrimps, *Fenneropenaeus indicus;* and 59.4% of the fleshy shrimps, *Fenneropenaeus chinensis.*

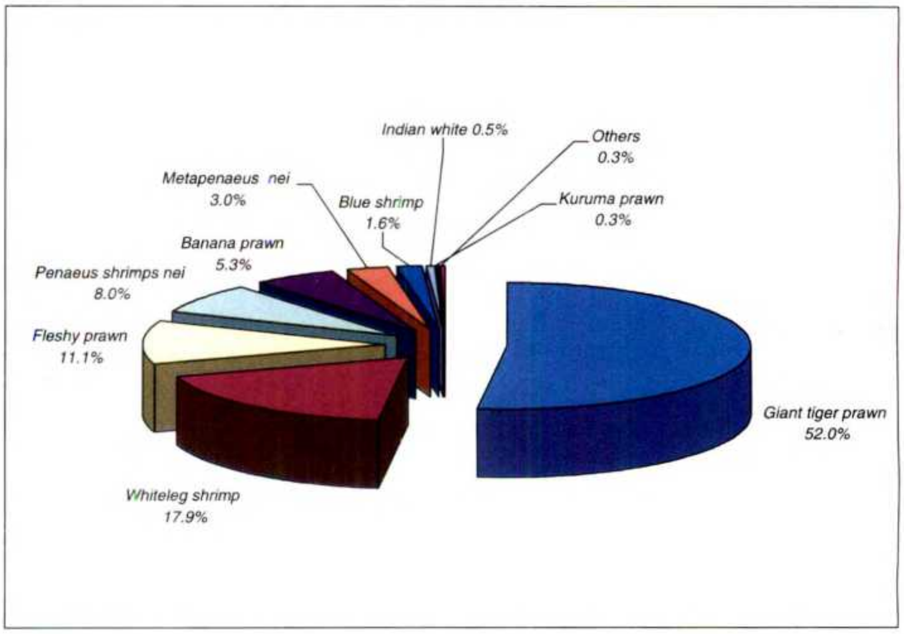


Figure 3: Percentage composition of world production of farmed shrimp by species, "nei" means not elsewhere included (Source: FAO Aquaculture Statistics)

P. monodon Still Dominates

The giant tiger prawn, which is known in international trade as black tiger, has been and continues to be the leading cultured species. As shown in Figure 3 some 52%, or 490,195 mt of the world's farmed shrimps consist of the giant tiger prawns. Coming a distant second is the whiteleg shrimp *L. vannamei* with 17.9% followed by the fleshy shrimp, *F. chinensis* with 11.1%. The fleshy shrimp used to be the second most important species after the jumbo tiger. With the collapse of the industry in China which produced 95% of the species, the fleshy shrimp was overtaken by the whitelegs in 1995. The banana shrimps, *F. merguiensis,* constitute only 5.3% and the Indian white *F. indicus,* only 0.5%. In spite of its very high price, especially when live, there is very little aquaculture of *Kuruma* shrimp, *M. japonicus,* which makes up only 0.3% of the total shrimp produced from aquaculture.

It should be noted that the top three culture species, namely *P.monodon, L.vannamei* and *F.chinensis,* are also endemic to the respective regions or countries where they are mostly produced. For sure there have been several attempts to introduce a species to a country where it is not endemic. There has been some limited success such as for instance the introduction of various penaeid species to French Polynesia where they are not native, but no country has ever become a major producer out of such introduction.

Asia Leads in Shrimp Production

During the last 14 years from 1984 to 1997 some 63 countries are listed in the FAO aquaculture statistics as having produced shrimps at one time or another. In 1997, nine of these countries did not report any production. This leaves 54 shrimp producing countries. In 1984 only 29 countries reported any shrimp production. The producing countries are found in all regions including Europe and the Mid-East. One of the newest entries to the shrimp culture club is Albania which reported a 10 mt production of *kuruma* shrimp in 1997.

If grouped according to major regions, Southeast Asia is still the leading shrimp producing region with 506,035 mt or 53.7% of the total. If all of Asia is considered together as one region, then it contributes 737,380 mt or 78% of the world's farmed shrimp, with the Americans contributing 198,925 mt or 21%. The remaining one per cent is distributed among all the other regions. In the Americas, the producing countries are all part of Latin America with the exception of the United States which managed to produce 1,200 mt despite stringent environmental laws and high labour cost.

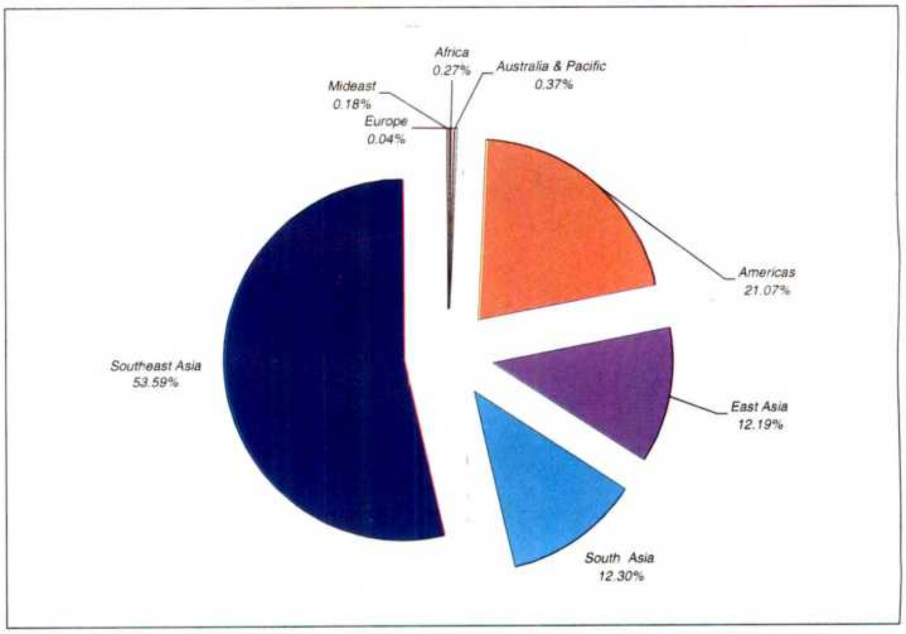


Figure 4: Percentage contribution of various regions to total world shrimp production of 941,814 mt in 1997 (Source: FAO Aquaculture Statistics)

Thailand

By country, Thailand is the leading producer in 1997 with 215,000 mt, a position it has maintained since 1993. Thailand's 1997 production is already 19% lower than its peak production of 265,524 mt in 1994. Like all other countries in Asia, Thailand also suffers from disease and environmental problems, not the least of which is the WSSV or White Spot Syndrome Virus. That Thailand managed to remain on top has been attributed to, among others, the fact that 80% of the 12,500 intensive culture farms are owned by small-scale farmers operating 1-2 ponds, each ranging in size from 0.16 - 1.6 ha. These farms produce 80% of Thailand's *P.monodon.* No big shrimp farms with high investment and large overheads have been able to survive. Kongkeo attributes the failure of the large farms to "insufficient care in farm management." Simply put, it means hired technicians and workers in large outfits cannot match the attention lavished by small shrimp farmers on their own farms.

It also helps that the government provides considerable assistance to the industry. Proof of this is the development of a Seawater Irrigation System (SIS) which brings in clean seawater that individual shrimp farms can tap. The SIS incorporates pre- and post- water treatment using mechanical and biological treatment measures (Tookwinas & Yingcharoen 1999). A good system of shrimp disease diagnosis, in place using the latest PCR technique, helps minimize the risk for Thai shrimp farmers by avoiding the use of WSSV-infected postlarvae and/or spawners.

Thai shrimp farmers have been very fast in expanding to new areas. When the original shrimp producing area in the eastern coast started having problems, production shifted to the southern coast. Now Thailand has expanded its production area 50 to 60 km inland, by using mainly freshwater. Estimates of the total area used range from 5,000 to 8,000 ha. Saltwater is trucked in and used only in the beginning and is diluted to very low salinity. Since it still uses some amount of saltwater, the practice has become controversial due to its impact on neighbouring rice fields. This has forced the government to restrict any further expansion and to limit its practice to coastal provinces only.

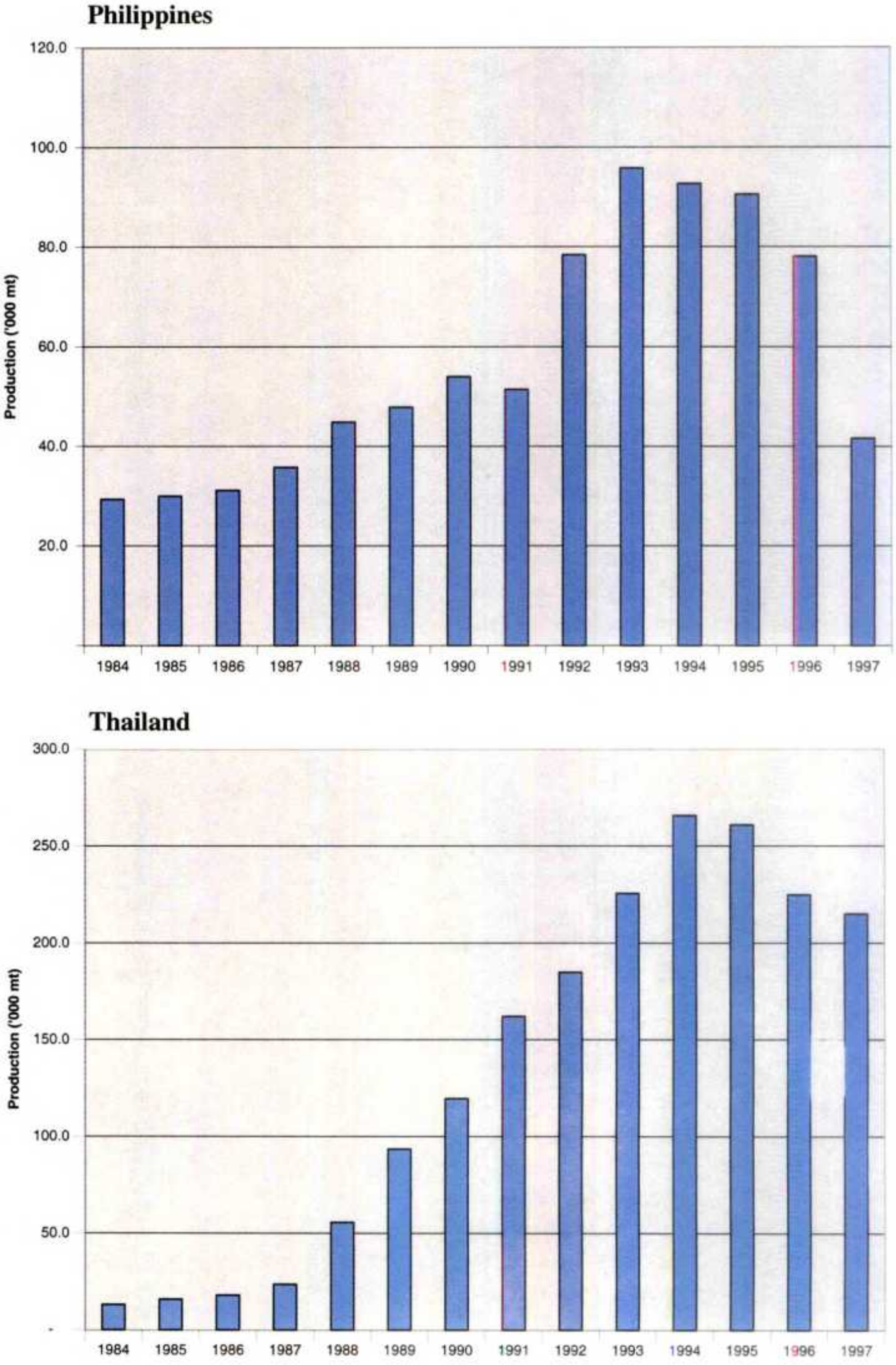


Figure 5: Production of farmed shrimp in the Philippines and Thailand

Indonesia

The distinction of being the top farmed-shrimp producer has somehow always eluded Indonesia. Between 1988 and 1989 it was second only to China. Thailand dislodged Indonesia in 1990 and Indonesia slipped to the third position. This was to be so until 1992. The next year China suffered a catastrophic production failure and Thailand became the leading farmed-shrimp producer, Indonesia rose up to become the second largest producer, a position it has maintained up to the present.

Indonesia produced 159,480 mt in 1997, its highest ever. Like many other places in Asia, shrimp farms in the main island of Java are also struggling against diseases brought about by unbridled intensification in the past. Unlike most other countries in Asia, however, Indonesia still has large undeveloped land in the outer islands particularly in Sumatra and therefore has the potential to later become the world's largest farmed shrimp producer.

In the province of Lampung which is located in southern Sumatra, one of the world's largest shrimp farms under the

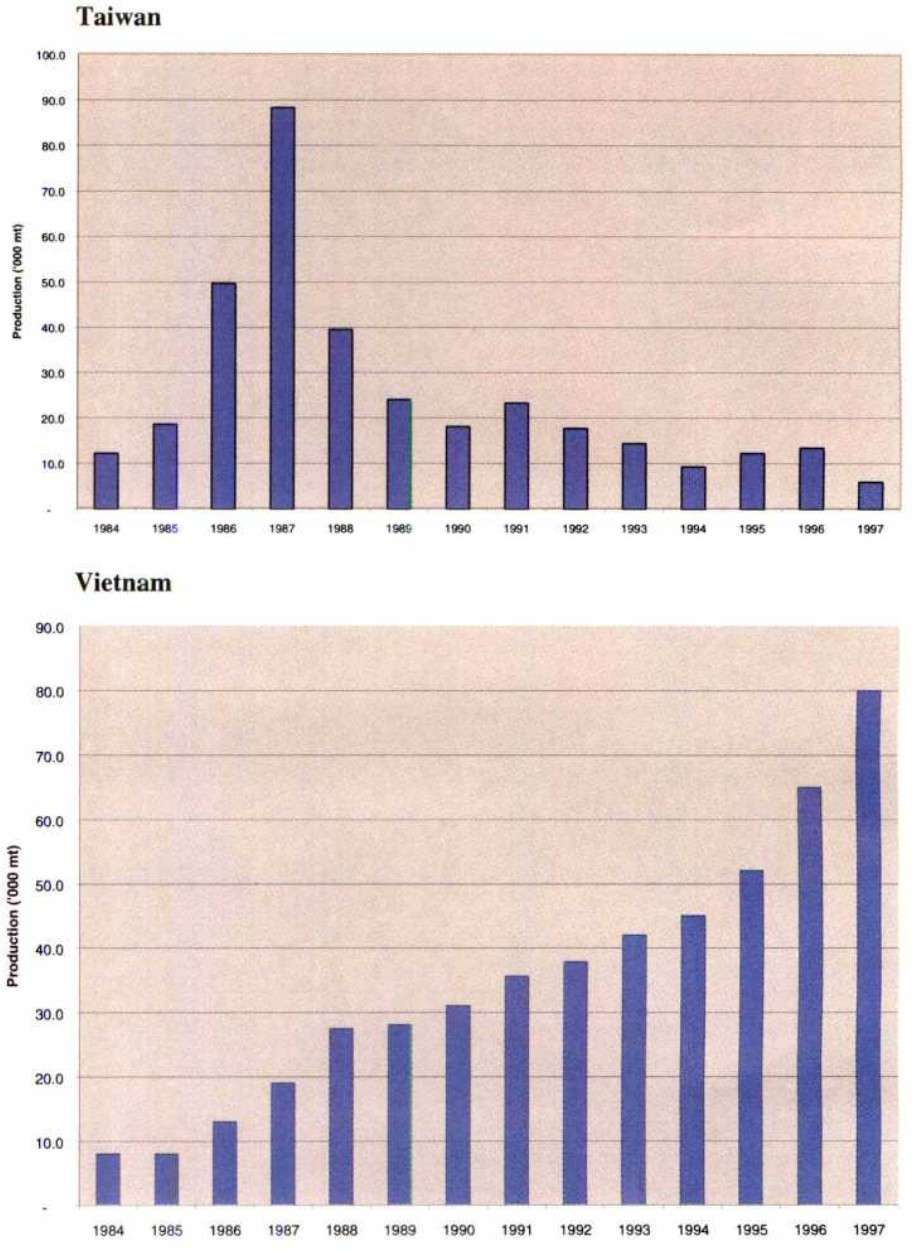


Figure 6: Production of farmed shrimp in Taiwan and Vietnam

control and management of one company can be found. Here the P.T. Dipasena Citra Darmaja has established 18,000 individual plastic-lined culture ponds covering some 4,500 ha in a 16,000 ha site. It has also obtained the rights to develop at least 50,000 ha of land which used to be under Wahyuni, a sister company. Most of the ponds measure 2,500 m², gross area, with a few measuring half a hectare. As provided for under Indonesian law, any aquaculture development over 30 ha in Java and 50 ha in islands outside Java has to be developed under the *Tambak Inti Rakyat* (TIR) or nucleus-estate concept. Dipasena is owned by the family that owns the tire manufacturing company Gadjah Tunggal and also used to own the Bank Central Asia until the Asian currency crisis virtually brought down a large portion of the Indonesian banking industry.

The nucleus of the TIR, to be operated by the developer, consists of the water supply system including the central pumping station; hatcheries for the production of seedstock; possibly a feedmill; processing, packing and marketing facilities as well as a corps of extension technicians. The "plasma" consist of the grow-out ponds which are to be distributed to individual growers who qualify under the programme. In the case of the Dipasena mega shrimp farm, the beneficiaries are migrants from the densely populated island of Java who are encouraged to migrate to the sparsely populated outer islands under the Indonesian government's *transmigrasi* programme. The families of such migrants are provided transportation to the island they intend to move into, farmland and shelter, and the means to get started, such as working animal and farm implements. In Lampung, the farmlands are ready-to-operate shrimp farms. Every shrimp farm consists of two grow-out ponds each measuring 2,500 m² gross or in some instances, one unit of 5,000 m² pond.

With half a hectare per family, one can see that 4,500 ha of ponds will have close to 10,000 beneficiary-families. With an average of four persons per family, the whole shrimp farm estate is a town in itself complete with schools, shops, mosques, a hospital and other amenities. The site runs for more than one hundred kilometers along the coast and has a total of more than 1,000 km of supply and discharge canals. The drainage canal is used as a main transport channel for both people and cargo.

In a scheme patterned after home financing programmes, the developer, in this case P.T. Dipasena, is paid by the servicing bank the full development cost plus a pre-agreed profit margin once each half-hectare farm is turned over to a qualified beneficiary. Each beneficiary is then expected to pay the servicing bank the cost of the farm over a set period of time at a pre-set amortization schedule. The nucleus company then provides the shrimp fry, feeds and other inputs and buys the shrimp produced for processing and export. In theory it is a win-win arrangement. The small farmer gets to own a modern shrimp farm and is assured of inputs and a market for his produce. The developer makes money on the development and continues to make money by providing the fry and other inputs and in the processing and export of the shrimps. Between 1996 and 1998 Dipasena reportedly produced some 16,000 to 19,000 mt of shrimps per year.

The 1997 Asian currency crisis has hit Indonesia hard. The Indonesian currency plummeted from 2,800 Rupiah to the US dollar to as low as 15,000 Rupiah. It has now stabilized somewhat at the 7,500 to 8,000 Rupiah level. This has affected the shrimp industry in general and Dipasena in particular. Feed mills are having a hard time sourcing dollars to import essential feed ingredients. Dipasena found the rupiah cost of the imported plastic liners soaring beyond the farm development price that has been pre-agreed with the servicing bank. Reports indicate that the development pace has slowed down considerably and that the company is considering the development of 5 ha earthen ponds for extensive culture for the additional 50,000 ha area. Just to provide a scale for comparison, the total brackishwater pond area said to be used for shrimp farming in the Philippines is only 54,000 ha.

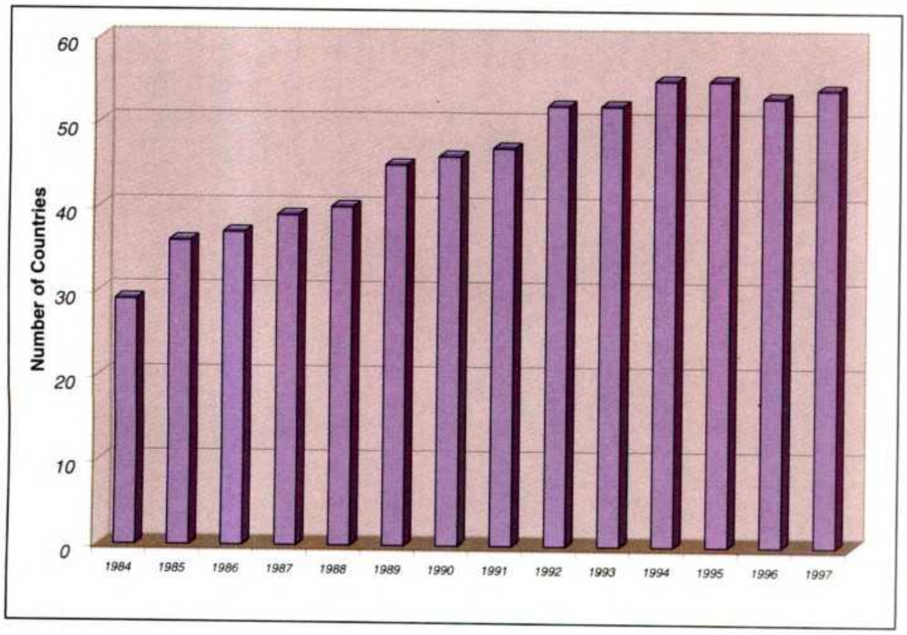
Before the Asian currency crisis and the political turmoil that came after it, the Indonesian Directorate General of Fisheries already had a plan to become the world's largest producer of farmed shrimps. This it intended to do by developing up to 250,000 ha of shrimp farms, with the government financing 30% of the cost, to produce one million tons of shrimps and earn up to US$8 billion annually. It should be noted that this level of production is even greater than the 1997 world production of cultured shrimps. It is not known whether the government still has the political will and the financial capability to push through such a large undertaking after all the troubles the country has been having.

China

As late as 1980, Chinese shrimp production from aquaculture was so insignificant that it was often lumped together with "others." While aquaculture is said to have started in China, it centered on freshwater aquaculture, and the country had no strong tradition in coastal saltwater aquaculture. Then it grew rapidly by leaps and bounds to reach 19,300 mt in 1984. After that, Chinese farmed shrimp production practically doubled itself every year during the succeeding three years to reach more than 153,272 mt in 1987. From successive years of 100% annual growth, the growth rate slowed down somewhat to only 30%. The 1998 production was 199,418 mt. Subsequently production suffered some minor setbacks between 1989 and 1990 but recovered somewhat in 1991 to exceed the 200,000 mt level. A minor decline in 1992 was followed by a catastrophic failure in 1993 which saw the production level fall from more than 200,000 to only 87,856 mt in 1993 and finally reach its nadir at 63,872 mt in 1994. Shrimp culture has since slowly recovered, with production already exceeding 100,000 mt in 1997.

The meteoric rise in the Chinese shrimp industry was made possible by a massive development programme along the Bohai Bay coastline in the northeast all the way down to Fujian in the south. Every year, thousands of hectares were developed by the Chinese government, when it came to the realisation that shrimp farming was the best way of making productive vast tracts of arid saline-alkaline coastal flat lands, providing employment and earning foreign exchange.

Figure 7: Number of countries reporting shrimp and prawn production from aquaculture, 1984 to 1997. (Source: FAO Aquaculture Statistics)



If subject to a standard feasibility study it is doubtful if any of the mega-farms along the northeastern coast would have been found feasible. Most of the area is above 30° N latitude, about the same level as Los Angeles, California. Therefore, the window of opportunity for shrimp farming is narrow. The ponds have to be stocked by July of each year at the latest and have to be harvested by November. The rest of the year it is too cold to do any aquaculture. The hatcheries operate only for brief period from mid-spring to early summer and have to produce all the fry required for the year in a period of no more than eight weeks.

But the Chinese government took a macro-economic approach to development. Without the shrimp farms the coastal flat lands were useless for anything else. Saline and highly alkaline and without any freshwater they cannot be used to grow crops. There was not enough economic activity to gainfully employ all the people. The government had to subsidize food, clothing and shelter. With the shrimp farms, money which could have gone into subsidy went into shrimp farm development and generated jobs for people starting from the construction stage. To maximise employment, all the construction works were done by manual labour. Machines were used very sparingly, if at all. Even the crushing of boulders into concrete aggregates was done by hand. Sand, gravel, cement, bricks and other construction materials were hauled to the construction sites either by wheelbarrows, if the distance was only a few kilometers away, or with bullock or donkey carts if the source of material was 50 km or more away. Cement mixing was done manually. In this manner, hundreds of thousands of people were gainfully employed to develop the shrimp farms.

The fall of the industry in 1993 has been attributed to over-stocking and the lack of provision for treating wastewater discharge. The heavy use of wet and fresh feedstuff such as small mollusks and brine shrimp biomass as feed exacerbated the build up of organic load in the water. With so many families depending on the industry the production failure must have hit shrimp producing areas hard. The industry is now showing signs of recovery and with the hard

A short note on scientific names

Many readers may be bewildered by the unfamiliar genus attached to a familiar species names. These 'new' generic names are not exactly new. They had always been there but only as subgenera, which are rarely used. Taxonomists have always known that the group of shrimps and prawns familiar to everyone as belonging to the genus *Penaeus* actually consists of different distinct groups based on their reproductive morphology and biology but hesitated to split it up due to the confusion that may ensue since everybody is already familiar and comfortable with *penaeus.* Very recently, Perez-Farfante and Kensley (1997) took the bold step of placing the different penaeid shrimps in their proper 'taxonomic bincards' by elevating the former subgenera to the level of full genera.

The black tiger and the green tiger shrimps remain under the genus *Penaeus* so they are still *P. monodon* and *P. semisulcatus* respectively. The Indian white shrimp *(P. indicus),* the banana shrimp *(P. merquiensis),* and the Chinese fleshy shrimp *(P. chinensis)* now belong to the genus *Fenneropenaeus.* The South American whiteleg and the blue shrimp should now be referred to as *Litopenaeus vannamei* and *Litopenaeus stylirostris* respectively. The *kuruma* shrimp *(P. japonicus)* is now *Marsupenaeus japonicus.* It should be noted that the specific names remain the same.

It will take time for these new generic names to be widely used. There may be some initial resistance. But then considering how wide and how fast the acceptance has been when taxonomists reclassified the Nile tilapia and the Mozambique tilapia from plain old Tilapia to the jawbreaking *Sarotherodon* and finally to the currently used tongue-twister *Oreochromis* within less than ten years, resistance to the changeover from plain old *Penaeus* to their respective "qualified-penaeus", may be futile - **W.G.Y.**

Perez-Farfante, I and B.Kensley 1997. Penaeoid and Sergestoid Shrimps and Prawns of the World. Keys and Diagnoses for the Families and Genera. Memoire due Musee National D'Histoire Naturelle. Paris, France 233 pp.

lesson already learned, Chinese shrimp farmers, like their counterparts everywhere, are likely to be more cautious this time.

The Rest of Asia

The case of Taiwan is already well known. From one of the top producers in 1986-87 Taiwan is now a net shrimp importer.

Philippine shrimp production continues to be sluggish due to widespread infection by the luminiscent *Vibrio* bacteria. At its peak in 1993, the Philippines produced 95,816 mt of all species but mostly of the giant tiger prawns, based on official government statistics which is also the basis for the FAO figures. The total 1997 production was 41,610 mt. The 10,000 mt production level in the 1997 issue of World Shrimp Farming published in the United States by *Shrimp News International* is even less than the export figure of 10,532 mt.

Unlike in Indonesia or Thailand, the Philippines shrimp growers do not have the luxury of finding new areas for development. The Philippines have run out of new sites to develop. Shrimp growers in Negros Occidental which used to be the center of intensive shrimp farming are slowly and very cautiously trying out lower densities, using probiotics, pond bio-remediation techniques and even enlisting the assistance of what was till now shrimp pond enemy number one – the tilapia – to minimize the risk of *Vibro* infection. Panguil Bay, which used to be the northern Mindanao equivalent of Negros Occidental is still a virtual disaster area as far as shrimp growing is concerned. Many of the shrimp growers have shifted to milkfish and lately to tilapia.

Vietnam is the country to watch. Vietnamese shrimp production has steadily increased from only 8,000 mt in 1985 to 80,000 in 1997, a ten-fold growth over 12 years. It now produces more than India which produced only 54,647 mt during the same year after touching a figure of 97,539 mt in 1995. The Indian Supreme Court ruling in 1997 which practically banned intensive shrimp farming within 500 m from the coastline and 200 m from rivers, did little to dampen Indian interest in shrimp farming. However, the widespread occurrence of WSSV has put a damper on further development and on high stocking rates. Bangladesh is also slowly inching up and with 56,480 mt in 1997 already produces more than the Philippines.

Ecuador and the Americas

Ecuador stands out as an oddity among the major shrimp producing countries - it is the only one outside Asia. As early as 1984 it was already producing more than any of the major shrimp producing countries in Asia. Since it was dependent totally on wild fry the industry remained at almost the same level in 1987 and was overtaken by China and Indonesia in 1985. Production perked up only when hatcheries started to be put up. Production exceeded the 100,000 mt level for the first time in 1991 and touched a peak of 113,137 mt in 1992. However, by that time China, Thailand and Indonesia were already producing much more. So Ecuador fell to the fourth position.

Production dropped to 83,404 mt in 1993 due to the Taura syndrome but has since recovered to reach an all time record production of 132,709 mt in 1997. There was an initial controversy over the etiology of the Taura syndrome. At first it was widely believed to be caused by toxic agents in the environment. However, it is now confirmed to be caused by a virus which has been designated Taura Syndrome Virus or TSV (Hasson et al 1995).

Practically all the Latin American countries from Mexico to Peru have also started their respective shrimp culture industries. However, except for Mexico which in 1997 produced 17,422 mt, all the rest produced less than 10,000 metric tons.

The Middle East

The Middle East with all its oil, is also striving to become a shrimp producing region. Many of the countries in the region including UAE, Kuwait and Yemen have initiated moves to venture into shrimp farming. So far however, serious and large-scale development has taken place only in two countries: the Kingdom of Saudi Arabia and the Islamic Republic of Iran.

Shrimp culture in Saudi Arabia started way back in 1983 when a private company, the Al-Balaa Establishment, developed a 20 ha pilot farm along the Red Sea, using largely Filipino consultants and technicians. This actually preceded whatever shrimp farming activity was carried out by the government's fish farming center. For more than 10 years the Al-Balaa operations at Al-Lith remained at the pilot level. It was only in the mid-1990s that the company decided to expand its operation to 100 ha. Now it is developing what is reported to be a 1,000 ha farm.

The most remarkable aspects of the Saudi Arabian shrimp farming operation are the species and the salinity level. Who would have thought that *P. monodon* can grow normally in salinity above 40 ppt? The water of the Red Sea is already 40 ppt. Once in the supply canal the very dry air and the high temperature drive the salinity up to 42 to 45 ppt. The *P. monodon* spawners are caught mostly in the southern part of the Red Sea near Yemen. These prawns must have already adjusted to the high salinity level of the area.

Saudi Arabia reported a production of 830 mt in 1997. It is not known how much of this is from the Al-Balaa farm in Al-Lith and how much from the newer Saudia Fisheries Company farm in Gizan province which has a series of circular ponds. The Al-Balaa farm in Al-Lith reportedly suffered huge production failure late in 1998. MBV had previously been detected in the farm but this time around the animals reportedly tested positive for WSSV. The entire 100 ha farm as well as three hatcheries are now on an extended dry out in an attempt to break the disease cycle.

Another company, the Gizan Agricultural Development Co. (GAZADCO), already has detailed engineering designs for initial 200 ha grow-out farms in a 500 ha site. It is now in the process of selecting the contractors and consulting engineers for the construction and development phase.

Iran is moving very fast after culture trials under a UNDP/FAO Project showed that it is possible to breed and grow local species found in the Persian Gulf which has an average salinity of 38 ppt. Initially two species were being farmed, *P. semisulcatus* and *F. indicus*. However, due to slow growth of the former when farmers shifted to a locally milled feed, all the farms are now stocked with *F. indicus*.

The UNDP/FAO Project also assisted Iran in the identification of sites suitable for shrimp culture development. Sites are now being developed all along the coast from the province of Khuzistan, which borders Iraq, to Chabahar in the south, which borders Pakistan. Space does not permit a full report on the development status. But to provide an example, in Khuzistan a 5,000 ha site is being developed. Thus far 2,500 ha (gross area) has been completed although only 570 ha (net water area) has been stocked. All the three other provinces already have hundreds of hectares of ponds stocked and thousands of hectares still awaiting development.

Unlike Saudia Arabia where the development has been purely a private sector initiative involving large companies, albeit with generous government incentives, Iran is taking a directed development approach to benefit smallholders. The government is developing the sites into a shrimp farm park by providing basic infrastructures such as main supply and drainage canals, road network and electricity. The developed area is then subdivided into 20 ha lots, which are awarded to qualified individuals. Veterans of the Iran-Iraq war or the children of those who died in the war are given priority. The recipients then become eligible for a bank loan to develop the 20 ha lot awarded to them. A working capital loan is also provided.

Since everything is developed according to a master plan the drainage canal outlet is always located very far from the supply canal inlet. There is no possibility of one farm pumping in the neighbour's discharge. In the 3,000 ha site in

Farmed Shrimp Production in Major Producing Countries, 1984 to 1997

(In '000 tonnes)

Year / Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Bangladesh	8.2	11.3	14.7	14.8	16.6	18.2	18.6	19.6	21.0	28.5	28.8	34.0	49.3	56.5
China	19.3	40.7	82.8	153.3	199.4	185.9	184.8	219.6	206.9	87.9	63.9	78.4	88.9	102.9
Ecuador	33.6	30.2	43.6	69.2	74.5	70.1	76.4	105.2	113.1	83.4	88.7	105.6	107.9	132.7
India	10.0	13.0	14.0	15.0	20.0	28.0	30.0	35.5	40.0	72.2	91.2	97.5	95.2	54.6
Indonesia	32.1	37.7	41.8	59.0	77.8	98.4	107.3	140.1	141.7	138.8	135.1	146.6	151.8	159.5
Philippines	29.3	29.9	31.1	35.7	44.9	47.9	54.0	51.4	78.4	95.8	92.6	90.5	78.1	41.6
Thailand	13.0	15.8	17.9	23.6	55.6	93.5	119.5	162.1	184.9	225.5	265.5	260.7	224.8	215.0
Vietnam	8.0	8.0	13.0	19.0	27.5	28.0	31.0	35.6	37.8	42.0	45.0	52.0	65.0	80.0
Taiwan	12.2	18.6	49.6	88.3	39.5	24.0	18.1	23.3	17.7	14.4	9.2	12.2	13.5	5.9

Khuzistan, the main drainage canal is 7 kilometers long and has a telescoping width starting at 200 m and gradually expanding to reach 500 m at the mouth.

Like China the northern part of Iran also has a problem of cold winters. However in the southern provinces of Chabahar and Hormuzgan the winter may be short enough to allow two croppings a year. The hatcheries operate only between April and July. Spawners are still obtained from the wild. The lack of spawners is now a serious constraint. After the spring spawning, no sexually gravid shrimps can be found anymore. A land-based broodstock and maturation system is now being tried in Shilat's Kollahi experimental station where shrimp culture technology was first demonstrated.

Shilat, the Iranian fisheries organization, is encouraging farmers to stock at no more than 20 fry/m^2. The aim is 50,000 mt annual production capability. With a 1997 production of 524 mt, it still has a long way to go.

Prospects for the Future

Worldwide interest in shrimp farming remains strong though no longer in the same feverish mode that characterized the rapid development during the 1980s. Production appears to have stabilized. The most serious issue facing the shrimp industry is sustainability. Environmental groups such as Greenpeace are convinced that shrimp farming as now practised can never be sustainable. Its high value and marketability always tempt growers to stock more than what the natural environment can safely bear. In the meantime work on less polluting feed which also uses less fish meal continues to be undertaken. Beneficial bacteria to hasten decomposition of waste products as well as to exclude the entry of disease bacteria are increasingly being used. The role of the mangrove as a possible nutrient sink to purify discharge water is being explored. Mechanical means, such as the use of ozone-generator to treat pond water, are also being tried.

However, the most ecologically sound approach is likely to be the zero-discharge system where waste water is treated using a combination of physical and biological processes and recycled. Once this system is fully worked out and shown to be financially viable, shrimp farming can become more friendly to the environment. Then perhaps even shrimp farms can be viewed as green spots.

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Ups and Downs of Shrimp Farming in India

by W.G. Yap

Shrimp culture practices should be made environmentally and socially acceptable, so that the industry's growth is healthy and sustainable. The setting up of an Aquaculture Authority to regulate shrimp farming is a positive development. So will the passage of the Aquaculture Authority Bill now before India's Parliament.

Even before shrimp farming became an important activity in India, shrimp, particularly the black tiger, *Penaeus monodon*, was already an important commodity. Starting in 1988 when catch figures on the species first appeared in FAO Fisheries Statistics, India was already landing 89,382 metric tons. This figure steadily rose to 130,570 mt in 1992 but dropped to 55,441 mt in 1996.

In contrast, only 20,000mt of *P.monodon* was produced in 1988, increasing to 40,000 mt in 1992. Shrimp culture has been practised for some time in India, but only at traditional and extensive levels. One of the more noteworthy practices is that of rotating shrimps with rice, significant especially in West Bengal.

It was in 1993 that shrimp farming really took off in India, increasing by 80.5% to 72,200 mt. It was a relatively late start; by this time, the industry had collapsed or had already reached its peak in most of the neighbouring Asian countries. Farmed shrimp production reached an all-time high of 97,317 mt in 1995 – at a time when landings from capture fisheries dropped to 78,912 mt. Thus for the first time *P. monodon* production from aquaculture exceeded that of capture fisheries. However this was short-lived. Shrimp aquaculture suffered a downturn in 1997 – only four years after it took off. This will be discussed in greater length later.

A lot of the credit for catapulting shrimp to its present importance in India should go to the tireless promotional effort of the Marine Product Export Development Authority (MPEDA). This body helped in obtaining the latest technology and establishing a market for Indian farmed shrimps.

MPEDA established the first-ever commercially successful shrimp hatchery in Vizag. Good-quality hatchery-reared fry was made available to farmers, paving the way for the entry of many new farmers to the sector.

Interestingly, while on an average between 1988 and 1997, 83% of the shrimps from capture fisheries came from the western side of India, the West Coast produced on an average only 32% of farmed shrimps. Shrimp farm development was more widespread and occurred earlier along the Bay of Bengal side of the Indian peninsula, particularly in the state of Andhra Pradesh. The topography of the East Coast is apparently more suitable for shrimp farm development than the topography of the west coast.

1993-1996 was the boom period of Indian shrimp aquaculture. It was during this period that large established companies, including the Tatas, entered the field. Prior to this, brackishwater aquaculture in general and shrimp culture in particular were in the hands of small and medium holders using traditional practices which were mostly extensive and natural food-based, relying mainly on wild-caught fry. In a way it was a blessing that the large Indian corporations "woke up late" to the potential of shrimp farming. By the time their farms were ready, the industry had collapsed in China, was levelling off in Indonesia and the Philippines and had reached its peak in Thailand.

The large companies put up both hatcheries and grow-out ponds and in some cases, such as Waterbase, even a feedmill. These large corporations, among them Bommidala and Rank Aqua in Nellore, employed the services of foreign consultants from Asia (Japan, Thailand, Taiwan and the Philippines) and the United States. Although shrimp larval rearing and shrimp culture is not exactly new to India, these were largely limited to government and university research stations, none of which had trained technicians to serve the needs of the rapidly growing industry. The corporate shrimp farms and hatcheries therefore had no choice but to source most, if not all, their technical manpower needs from foreign countries such as Thailand and the Philippines. Initially, some American technicians were also involved but their engagement did not last long since similar or even better expertise could be recruited from Asia at a much lower cost.

The early to mid-1990s was a good time to recruit experienced technicians, particularly from the Philippines, because by then shrimp farming had started to peak. Furthermore the eruption of Mt. Pinatubo in 1991 destroyed and closed down many hatcheries, including the country's largest hatchery, in Zambales – one of the Philippines' prime hatchery sites which faces South China Sea. It was not surprising that between 1992 and 1997, Filipino technicians could be found everywhere in India – Tamil Nadu to as far north as Orissa in the east coast and Maharashtra in the West.

Production of shrimps from capture fisheries and aquaculture, India, 1987 to 1997. (FAO, 1999 Fisheries and Aquaculture Statistics)

In metric tons

Year	Capture	Culture
1987	–	15,000
1988	89,382	20,000
1989	82,457	28,000
1990	92,661	29,985
1991	119,840	35,500
1992	130,570	40,000
1993	102,474	72,200
1994	128,467	91,168
1995	78,972	97,317
1996	55,441	94,990
1997	91,464	54,483

The continued reliance of hatcheries on foreign technicians (even after local capability was established) was due to a number of reasons. One, many of the foreign technicians were willing to enter into "no-production – no pay" arrangements instead of a straight salary regardless of production success. It was common for some foreign technicians to be paid merely an assured room and board plus a fee on a per fry basis. There was no set formula for such sharing but this was usually calculated on a graduated scale. Thus for the first 20 million PLs, the technicians may agree on getting only 2 paise per fry, increasing to 3 paise per fry between 20 and 30 million, 4 paise between 30 and 40 million and so on. The technicians' share might reach 10 paise per fry at the 100 million PL level. Large corporate hatcheries often prefer to pay a fixed salary plus a production bonus if a pre-agreed target is attained.

Another reason for the reliance on foreign technicians is that the hatcheries are unable to keep local technicians – they tend to move on once they have learned the basics. (This situation continues to this day.) Invariably these technicians will put up their own consultancy firm since many are academically qualified, with an MSc or even a PhD. Some of the Indian shrimp hatchery or grow-out farm technicians eventually went to Saudi Arabia or Iran when the industry in India started to suffer a slump, and bumped into some of the Filipino technicians they had already been acquainted with in India.

The period 1993-1996 was a heyday for the hatcheries. With grow-out farms fast expanding, shrimp fry were in great demand – so much so that cash deposits were made by pond operators just to be assured of getting the number of fry required. Often PLs were sold when they were still at a relatively young stage. The risk-taking technicians stood to earn a considerable sum. One problem, however, was collecting their full share of the income from some of the shrewder hatchery owners. Even if they did collect the money, remitting it home was always a problem because of India's restrictive foreign exchange controls.

Despite the foreign exchange and the employment generated by shrimps, the shrimp culture industry has a lot of detractors in India. They are among the most active and vociferous in the world in denouncing the effect of shrimp culture on the mangrove and the marine environment, and its negative social impact on rural communities. As a result of a suit filed by S. Jagannathan, a social activist, against the Government of India, the country's Supreme Court issued a ruling in December 1996 banning semi-intensive and intensive shrimp farming within 500 meters of the high water line or within the Coastal Regulation Zone (CRZ). The basis of the Supreme Court's decision was the Coastal Regulation Zone notification of 1991 issued under the Environmental Protection Act of 1986.

What was the effect of the Supreme Court order? Intensive farming in any case had been discontinued after 1994 because of the white spot disease. Large corporate projects – which could be regarded as semi-intensive – had also started to dwindle since 1995. They took shelter under the Supreme Court order to wind up. The Supreme Court order for demolition of intensive farms within the CRZ was stayed in March 1997 and again in August 1997. The stay is still operative.

An Aquaculture Authority (AA) was set up as a result of the Supreme Court's directive in its December 1996 order. The AA has taken up the issue of licences for shrimp farms outside the CRZ and for traditional and improved traditional farms within the CRZ.

Thus in 1997 hatcheries continued to operate and enjoyed a good market for their fry from individually owned farms, which did not engage in intensive farming. But since it is virtually impossible to draw a line between "extensive" and "semi-intensive", many of the farms continued to stock more than what could technically be considered extensive.

The production of farmed shrimps in 1997 at 54,483 mt was 42.6% lower than the 1996 figure of 94,990 mt. This decline was due to both the white spot virus attack and the Supreme Court order. Farmers did not risk stocking their ponds, because although the Supreme Court had stayed its December 1996 order, review petitions were pending. Farmers weren't sure whether there would be any relief for them. This situation continued till August 1997.

A note about the production statistics in the report – the figures are all based on FAO Aquaculture Statistics, which in turn are based on official government statistical reports to FAO. It is considerably higher than the figures that appear in "World Shrimp Farming", the annual report published by the US-based *Shrimp News International*. For instance, the 1997 farmed shrimp production figure for India in "World Shrimp Farming" is only 40,000 mt. Production figures in "World Shrimp Farming" are based on the "guesstimates" of *Shrimp News International*'s network of volunteer-correspondents from the industry. Which figure is more accurate, the government's or those of independent personalities, is anybody's guess. But the government's method of obtaining statistics is likely to be more systematic and consistent.

There is still a strong interest in shrimp farming, despite the white spot virus. But those concerned await the passage of the proposed Aquaculture Authority Bill by India's Parliament. This bill will encourage commercial banks to meet the working capital requirements, including insurance of small-scale farmers and thereby revive shrimp farming.

Meanwhile, in view of the potentially high returns, many independent growers continue to farm shrimps in spite of the risks. The introduction of modern diagnostic tools such as DOT blot and PCR techniques to check the presence or absence of white spot virus in the shrimp fry prior to purchase and stocking, helps reduce the risk. In addition, new management techniques are being tried. This involves the use of reservoirs, and bio-remediation through various micro-organisms and enzymes, probiotics and immuno-stimulants added to the feed, usually in combination with one another.

There is no doubt that in India the present disease problem will lead shrimp farmers to adopt more sustainable practices. As long as the world market for shrimp remains strong, shrimp will continue to generate foreign exchange and provide jobs. After all, while shrimp account for only 35% of the marine product export by volume, they account for 71% by value. Thus it is in everybody's interest that shrimp culture practices are made environmentally friendly and socially acceptable so that the industry becomes sustainable.

Comic Book on Shrimp Culture

The comic book of guidelines on shrimp culture (See *Bay of Bengal News,* September 1999) is out. It has been produced by the Aquaculture Foundation of India, on the basis of surveys of existing shrimp culture practices in Andhra Pradesh and West Bengal, and discussions with several institutions and individuals. These include the BOBP; shrimp farmers and the Departments of Fisheries of the two states; the Director of the Central Institute of Brackishwater Aquaculture (CIBA), Dr. G.R.M. Rao, and scientists of CIBA; the Director of the Marine Products Export Development Authority (MPEDA), Mr. V. Venkatesan; Dr. Y.S. Yadava, formerly Fisheries Development Commissioner of the Government of India; and the Ramakrishna Ashram Krishi Vigyan Kendra, a West Bengal NGO.

The comic book was produced in three languages – English, Telugu and Bengali. The project was made possible with a $10,000 grant from the Netherlands Embassy. The BOBP, in particular its Director, Dr. Kee-Chai Chong, closely monitored the project, provided technical support to the AFI and additional funds for printing.

The comic book was scripted by Kamala Chandrakant and illustrated by Lalitha Thyagarajan.

"The comic book is well-researched, presented imaginatively, in story form, and is attractively illustrated," says Dr. Chong. "Sustainable shrimp culture cannot be achieved overnight. It is a process, and we are happy to have encouraged it and participated in it." Dr. M. Sakthivel, President of AFI, says "We hope the Bengali and Telugu versions of the book help small-scale shrimp farmers in their efforts to raise a sustainable shrimp crop."

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HEALTHY ENVIRONMENT - HEALTHY SHRIMPS
The WONDER SHRIMP
BOBP
BAY OF BENGAL PROGRAMME

Farmed Seafood: combating lies with facts

This article, reproduced from Fish Farming International, London, is an abridged version of a letter sent to the magazine by the Global Aquaculture Alliance.

Is it environmentally responsible to buy and sell farmed seafood? This is increasingly being asked of consumers and retailers. Unfortunately, only one side of the story is being told. We need to respond clearly with facts, such as: aquaculture is the only sustainable mechanism to increase seafood production.

The world's population exceeds six billion and is still growing. To feed us all for the next 40 years, we need to produce more than all the food produced since the beginning of time. How can we do that?

Ocean catches seem to have reached their limit. The solution is farming – the same as ages go when wild game became scarce.

In a *New York Times* interview, management guru Peter Drucker predicted that one of the new century's most exciting industries was not the Internet, but fish farming.

The UN World Commission on Environment and Development defines sustainable development as: meeting current needs without compromising the ability of future generations to meet theirs.

Not all environmentalists agree. Randal O'Toole of the environmental 'think tank', the Thoreau Institute, divides the environmental movement into preservationists and conservationists.

Preservationists say 'nature knows best' and should be preserved at any cost. Sustainability means "no impact", so neither aquaculture nor any other system of food production has much growing room.

Conservationists are more realistic. Their goal is to maintain ecosystems through collaborative management by public and private stakeholders at a local level.

Clearly, aquaculturists are also conservationists. In most areas, water rights are publicly held and access to space requires farmers to engage in a permitting process.

Regardless of their leanings, environmental groups make an important contribution by alerting the public to risks. However, as they proliferate and compete for public attention and funding, they tend to reduce facts to 'soundbites'.

In a recent survey to quantify cancer risks, 400 experts were asked to rank risks such as sunlight, tobacco, etc. The same questionnaire sent to 100 environmental groups showed that environmentalists greatly magnify many risks.

Recently, the National Audubon Society in the US released a package of educational materials, including a small card for use at restaurants and grocery stores.

Along a sliding scale from best to worst, it rates 34 of the world's major seafood groups. Farmed shrimp and salmon are flagged by a "do not eat" symbol. This was backed by a two-page guide.

The guide refers to farmed shrimp in just one soundbite: "Shrimp farms pollute and destroy the habitat – so much so that the Indian government recently ordered more than 100 farms closed." Let's look at these assertions.

- *"Shrimp farms pollute."* To the consumer, pollution conjures up visions of smoke-stacks, toxic waste, etc. But shrimp farm waste is natural algae and organic matter; neither toxic nor illegal.

  Over the last 10 years, farmers have halved the water discharged per kilogramme of shrimp produced, so the assertion is both exaggerated and out of date.

- *"Shrimp farms ... destroy habitat."* This refers to mangroves. Early shrimp farmers were actually encouraged by governments to tap mangrove areas, but they soon learned that the poor drainage and acidic soils were not well-suited for pond construction.

  It is far better to build farms on higher ground, and leave mangrove areas intact to help recycle discharges and protect farms from erosion and storms. Shrimp farmers recognise their value and are leading mangrove conservationists.

  In Honduras, high altitude imagery shows that the area of mangroves in the vicinity of shrimp farms actually increased in the last 10 years.

- *"The Indian government recently ordered more than 100 farms closed."* This is misleading. In 1995, shortly after shrimp farming began in India, a shrimp disease passed through many farms. In 1996 the Indian Supreme Court ruled to close all shrimp farms within 500 metres of the high-tide line.

  However, the decision was later stayed before it could take effect. The government proposes to introduce an aquaculture bill with environmental safeguards for sustainable development. Meanwhile, the farms are learning to manage disease, and production has increased to some 70,000 tonnes a year.

On salmon, the Audubon Guide uses one soundbite: "Salmon farming pollutes, displaces wild fish, and prompts the shooting of predatory seals near farms." Let's consider each assertion.

- *"Salmon farming pollutes."* This is a distortion of the truth. Most salmon are raised in cages in cold, deep water along protected coastlines. Regulatory frameworks are well established, and siting is subject to strong oversight based on sophisticated water quality models.

A typical salmon farm with 18 cages and 50,000 salmon produces 147lb (dry weight) of fecal matter per tide change of 864 million gallons of water. This is the equivalent of two tablespoons in 24 backyard swimming pools.

Lease applications for sites are not renewed that don't meet strict environmental standards.

In British Columbia, Aquametrix Research analyzed data from three studies reviewing the environmental impact of salmon farming waste. The conclusions were: "Actual loss of wastes to the environment by today's industry is approximately one-third of what it was in the late 1980s. This in spite of the fact that production levels at these sites have increased by approximately three times."

Antibiotics also generate heated debate. Using the worldwide average as an example, no more than 2% of feed given to farmed salmon is medicated with antibiotics, which are used to minimize the impact of naturally occurring bacterial infections.

In Maine, all eggs and sperm are tested for disease, thus ensuring that juveniles are disease-free. As extra insurance, each juvenile is vaccinated – much like a child is immunised – before being placed in a cage. Thanks to this, in 1998 Atlantic Salmon of Maine had only 0.00183% of feed medicated.

- *"Salmon farming displaces wild salmon."* This is unfounded. The question of escapees mating with or weakening wild salmon is greatly contested. DNA testing of wild stocks is under-way in several areas to see if any contain markings that suggest cross-breeding. So far, geneticists disagree on whether testing shows a cross-breeding link.

  In fact, by keeping a variety of salmon genes thriving through salmon farming, a broad gene pool is being preserved. With the advent of vaccinations and disease-free broodstock, the argument that salmon cages spawn diseases that kill wild salmon is difficult to substantiate.

  It is known that for 100 years before salmon farming started in Maine, the federal government stocked millions of salmon into the rivers of Maine and never once did a self-sustaining run ever materialize.

- *"Salmon farming prompts the shooting of predatory seals near farms."* This is not supported by facts. A 1998 study by University of Maine's Department of Wildlife Ecology found that in the state's salmon farming region, harbour seal population growth is more robust than in any other part of the state. Other studies show that various shellfish, as well as bald eagles and osprey, also flourish near Maine's salmon farms.

Aquaculturists should recognise the need of seafood buyers and consumers to be better informed. From an environmental perspective, aquaculture dovetails with conservationist goals better than many standard agricultural practices do.

Environmental groups tend to exaggerate the facts and appeal to emotion. The National Audubon Society's soundbite judgements are not supported by the facts.

The truth is that aquaculture is a young, rapidly-growing industry with a promising future as the only sustainable means of increasing seafood supply to help feed the world's growing population.

Website : www.gaalliance.org

"Ocean catches have reached their limit. The solution is farming."

Pic. Courtesy Dept. of Tourism, Singapore

Small-Scale Fisheries in India: Does It Exist Any More?

by Venkatesh Salagrama

Many changes have occurred in fishing villages during the last two decades in the way fish are caught, processed and marketed. But these changes have been mostly confined to affluent fisherfolk. A large majority of the people remain untouched by change. "Small-scale fisheries does not exist any more, but small-scale fishers do" is the author's sombre conclusion.

A question that often crops up nowadays in fisheries circles is "Does small-scale fisheries exist any more?" Admittedly, there have been many significant and revolutionary advances in the way fish are caught, processed and marketed in the sector, and the implicit assumption behind the question is, why bother about small-scale fisheries when they have changed to an extent where little distinction remains between the traditional small-scale and mechanised operations?

Motorization of traditional crafts, use of new materials like plywood and fibreglass reinforced plastic (FRP) in boat-building, synthetic fishing gears that have become increasingly more sophisticated and species-specific, the emergence of new areas of growth such as aquaculture – these factors have had a tremendous impact on the small-scale sector. Result: it is almost unrecognisable from what it used to be hardly two decades ago. Market forces entered fisheries in general, and small-scale fisheries in particular, in a big way in the 1990s, and opened up opportunities for excellent returns for the produce. On the social front, more children from fishing communities are going to schools than previously. English-medium 'convent' schools have come up in many of the bigger fishing villages. Health services have improved, transport and communications facilities have got better, almost every fishing village has been electrified, and though clean water is still a problem, it is not as serious as it

once was. And yes, the cable TV revolution has definitely reached many fishing villages.

However, a brief appraisal of the growth of this sector during the last two decades shows a development pattern that is mostly confined to the more affluent sections within fisherfolk communities. A large majority of the people remains untouched. There is no denying that there has been an improvement in the quality of life over the period, but this phenomenon covers the entire spectrum of the population, and owes very little to developments within fisheries.

Generally, the word 'small-scale fisheries' is implied to mean traditional – indigenous – fishing systems. To begin with, everything in the fisheries sector was traditional and, obviously, small-scale. The fishing communities were, by and large, homogeneous. There was a small craft-owning class and a large worker class, but economically there was little distinction between the classes: the difference in incomes between the owners and the crew was not all that great to set them apart. In many areas, traditional management systems held the power of control over the community. A system of caste-within-caste was apparently in operation which ensured that strict division of labour was enforced. Fishing was confined to the waters close to the villages, and most fish were sold within a short radius from the landing centre. Men's roles were confined to fishing and women did the processing and trading, besides running the household. Overall, it was subsistence fisheries, where everyone clung together for survival.

The technology-oriented and technology-based development efforts have given rise to a new class in the fishing villages, a class that had not existed previously. The appearance of mechanised boats – trawlers – in the early 1970s set in motion a process of change which accelerated through the 1980s and the 1990s. It split the craft-owning class into two: those who saw a future in the trawlers and were adept enough to make the change to trawling, and those who remained behind as traditional craft owners, for whatever reasons. As it turned out, the 1970s were the golden age of trawlers, and many fortunes were made and new power centres emerged in the sector. It is important to remember that those who made the migration to the mechanised sector were from within the fisher community, albeit from the more influential sections, and consequently, they continue to make decisions on behalf of the community, and are generally the people consulted on all matters concerning the fishers. Naturally they would be loath to any changes that affect the status quo. The fantastic returns in the trawling industry also attracted a large number of rich outsiders, who were lured by generous government incentives. It is this small craft-owning class which, for all intents and purposes, stands for the 'fishing industry' in the minds of the government and the public. 'Valuable foreign exchange earners' as a synonym for all shrimp-hunters entered the vocabulary, and continues to be the

Pic: E Amalore

most important argument for supporting the industry.

Going back to the traditional sector, as motorization became necessary, wood became scarce, and alternative boat building materials like FRP entered the scene, there was another split among the craft-owning classes. Those who could, or were lucky enough to obtain the boats through generous government schemes, managed to get hold of them and emerged as the *nouveau riche* class – not yet the trawler-class but affluent enough to stand apart from the mass. This period also saw the emergence of new market relationships, which were to have far-reaching consequences. A semblance of prosperity was seen in many fishing villages in the mid-1980s, and attracted large numbers of outsiders - mostly from the agricultural sector – into fisheries. Being unskilled, they settled down to jobs such as petty fish trading, which intensified competition at the landing centres. The story of these new migrants is both interesting and tragic. By quitting their traditional occupations, they became outcastes within their own communities. On the other hand, the fishing communities and their support agencies never treated the immigrants as anything but outsiders.

More interesting changes occurred to those members of the craft-owning class who could not manage the jump to the mechanised sector or to the 'fibreglass' class. Some clung to the trappings of their class for as long as they could – like the feudal landlords of the late 19th century India – before quickly joining the working classes, or getting out of the sector for good, as happened in the early 1990s in some parts of Andhra Pradesh. Many others adapted themselves to the changing situation quite admirably. They secured new positions that evolved with the increasing commercialisation of the sector and quickly became indispensable. Many became 'traders' – another new class that emerged in the 1980s: middlemen who purchased fish and high value prawns from the fishermen for sending up to distant export agencies. A sizeable number of people also became political animals: 'fixers' with the right connections, whose sole livelihood depended on 'arranging' things for a fee. In the end, members of this once craft-owning class – which is hardly a homogeneous entity any longer – managed to become quite influential in the communities. Many of them are better off than ever before. Like the trawler-owning class, they have every reason to ensure that things remain as they are forever.

In the post-harvest sector, there were traditionally two classes: processors who salted and/or dried large quantities of the fish landed in the village, and a few petty traders who carried the fish to the nearby markets for sale. In the 1990s, ice made an appearance in many fish landing centres, and that changed the equation drastically. A third class appeared – the trader-middlemen, as mentioned above – who cornered a major portion of the catches for export markets; the once-powerful fish processors suddenly found themselves short-changed. And the decline is drastic: traditional fish processing is dwindling, and the number of people employed in the activity has come down significantly. Some large-scale processors switched to the fresh fish trade, becoming trader-middlemen themselves, but many medium- and small-scale processors had to opt out of the business and seek alternate opportunities.

Which brings us to the working classes. They have traditionally constituted the majority – outnumbering the affluent classes by many times – and with the fresh influx of people from the craft-owning classes and from other sectors, their numbers have, if anything, gone up further. What has been the impact of developments of the last two decades on this vast majority? The picture that emerges is not very bright: they did benefit from development programmes. But by and large, the development efforts have given them just enough pace to keep up with the changes, but not enough to take advantage of it. In other words, they were always poor, and continue to remain so.

Under the influence of market forces, traditional management systems gradually became corrupt and are defunct in many areas – an indication of the shift of focus from community survival to individual gain. With most subsistence fisheries being replaced by commercial systems, marginalisation and vulnerability are increasing. Another effect of the emergence of new technologies and new market forces is that traditional boat-building is now a vanishing art, so are village-level activities like net making, leaving a large number of artisans unemployed. Idle manpower in the fishing villages is on the rise. Conflicts within and from outside the community are on the rise, and there is an ever-growing pressure from external forces, which traditional villagers do not even know, let alone understand. Thatched roofs still remain the predominant features of a fishing village. Educational standards continue to be abysmally poor, and in the face of uncertain catches, more children are entering into occupations such as shrimp-seed collection.

Taking one step backward, in small-scale fisheries, in the accepted sense of the word, nothing remains small-scale: the boats are expensive, motorization is expensive, there is an ever-growing range of species-specific nets that a boat needs to carry which increases investment, the operating costs are high, cost of ice is a new investment, payment of large sums as advances to the crews is a major expense – and so on. The market linkages and networks which have developed during the last decade make the fish trade as complex as any boardroom conference.

By no stretch of the imagination can any of the current activities be classified as small-scale or 'traditional'. Does small-scale fisheries exist any more? No, it does not. But small-scale fishers do. Their lives are essentially the same as ever. Their socio-economic conditions were in the past characterised by uncertainty, poverty and conflicts, and these characteristics continue to be endemic to a large majority of people today. In a situation where the external support services have succeeded magnificently, but the people who were to benefit from them have remained poor ("The operation is a success, but the patient is dead!"), it is pertinent to pose the question whether the services were relevant to the needs of the people.

The answer to this question opens a whole range of opportunities for helping the fishers help themselves. Nowhere is there a better case for people-centred approaches than in small-scale fisheries. And nowhere are they more urgently needed either.

Documentation of Learnings - Indonesia

A two-member Mission has documented the learnings from the activities of BOBP's Third Phase. Here are the findings of the Mission relating to the work in Indonesia.*

Indonesia, the largest archipelagic State, has a coastline of 80 000 km and a jurisdiction over 3.1 million sq. km of territorial waters and 2.7 million sq. km of exclusive economic zone. The contribution of fisheries to food security, employment and income has been recognized by the Government of Indonesia. Fisheries development is an integral part of the National Economic and Social Plan.

Like other countries in South and Southeast Asia, the marine fisheries of Indonesia is a multi-gear, multi-species fisheries, operated by a large number of small-scale fishermen and confined to inshore and coastal waters. Fisheries in Indonesia is primarily artisanal and the fishing fleet is dominated by small boats, non-powered and outboard and inboard motor-powered boats of less than 30 GRT.

The Directorate General of Fisheries (DGF), the Provincial Fisheries Service (PFS) and the Central Research Institute for Fisheries (including the Research Institute for Marine Fisheries) are government agencies responsible for administration, development and management of the fishing industry in Indonesia. The DGF and the research institutes are under the Ministry of Agriculture, while the Provincial Fisheries Service is under the Ministry of Home Affairs. The administration of the local fisheries industry is the responsibility of the Governor at the provincial level, and of the Head of the District at the district level.

The Mission (to document the learnings of BOBP's Third Phase) visited Jakarta, Indonesia during the period 17-21 July, 1999. During the visit, the Mission had detailed discussions with officials of the Directorate General of Fisheries and of the Asian Development Bank's Project at Jakarta. The Mission, however, could not visit any of the field sites; its observations are therefore based on interactions with DGF and others.

The "Situation Analysis" conducted in 1994 at the start of BOBP3 identified inadequate management measures and inappropriate enforcement mechanisms, leading to conflicts between groups of fishermen and other stakeholders as management problems to be addressed by the Third Phase. The recent development of mariculture (leading to collection of wild seed using destructive fishing practices), the unmanaged development of fisheries to generate feed for the mariculture sector, and pollution were cited as topical examples. Realizing the complexity of such problems and given the constraints it faces in terms of manpower and resources, the government expressed its keen interest in addressing the problems comprehensively through participatory approaches at the community level.

The Situation Analysis therefore proposed development of model management schemes for coastal fisheries and mariculture using participatory, community-based approaches to conserve and sustain coastal fisheries resources and improve the livelihood of fisherfolk. The Analysis recommended a pilot exercise in the Tapian Nauli Bay area of North Sumatra Province, in the hope that learnings from the exercise could be extended to other parts of Indonesia.

The functional focus of the DOF/BOBP Project was defined as Community-Based Fisheries Management (CBFM) and mariculture. The geographical focus of the Project was identified as Tapian Nauli Bay area in the North Sumatra Province of Indonesia.

The objectives of BOBP3 in Indonesia were to undertake CBFM, and facilitate and enable improved management of mariculture, anchovy lift-net fishery and small-scale fisheries in the Tapian Nauli Bay area of North Sumatra Province, so as to evolve model fishing villages. Awareness building, strengthening the institutional capacity of concerned agencies and provision of technical assistance were considered as the key activities to attain such objectives. The Project was initiated in 1995. Some of the important activities undertaken by the Project:

- Selected DGF, PFS and DFS staff were trained in the conduct of stakeholder identification, stakeholder analysis, stakeholder communications and perceptions analysis. The staff designed and developed a study design to undertake stakeholder analysis.
- Organized a stakeholder consultation in 1995 which brought together representatives of stakeholders of all three target fisheries for discussing their problems and concerns and their suggestions for solution options.
- Conducted a Workshop in Medan, North Sumatra, in 1996, to discuss the findings of the stakeholder analysis. On the basis of the analysis, a project strategy and work plan were evolved. The Project work plan was endorsed by DGF, PFS and DFS and commitments were made regarding responsibility and resource allocations to facilitate the Project.
- Completed field work for the study of values, perceptions and attitudes of fisherfolk and other stakeholders. BOBP staff conducted an orientation in the processing of questionnaires into ready-made information for analysis.

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* The Mission consisted of Dr. G.L. Preston (Fisheries Consultant, Gillet, Preston and Associates Inc.), and Dr. Y.S. Yadava, Fisheries Development Commissioner, Government of India.

Fisherfolk need to be prepared for community-based fisheries management.

- BOBP in co-operation with the DGF and the ADB-supported Project on Coastal Community Development and Coastal Fisheries Management organized a 4-day Workshop on CBFM in Bengkalis, Riau Province, which helped the participants drawn from various provinces to better understand CBFM and incorporate the approaches in their efforts.

To implement the Project, a multi-pronged strategy was evolved on the basis of Stakeholder Analysis. At the national level it was proposed that efforts had to be taken to build awareness and promote the concepts of CBFM and stakeholder approaches. At the local level, the approach was to build awareness on the need for, the benefits of and the methods of management amongst all stakeholders; promote and encourage consultation and negotiation amongst and between stakeholders to arrive at management plans; and provide technical inputs to enable more sustainable practices in fisheries. The overall approach was to take the participatory consultative route, wherein solutions and strategies would emerge from consultations amongst stakeholders.

DGF designated the PFS of North Sumatra and the DFS of Sibolga and Tapian Nauli Districts as the agencies responsible for implementation of the BOBP-assisted activity. These staff were trained in the conduct of the regional study of values, perceptions and attitudes of fisherfolk and other stakeholders towards fisheries resources, fishing practices, and fisheries management. The questionnaire was also translated into Bahasa Indonesia. DGF incorporated fund allocations into their annual budget to cover necessary expenses beyond the assistance available from BOBP sources.

The Mission, during their visit to Jakarta, had detailed discussions with the Director General of Fisheries, Bapak. Untung Wahyono and officers of the DGF responsible for implementation of BOBP3. The DGF at the outset said that the spirit and philosophy of the Project has been good. The fishermen have been very enthusiastic about the Programme, and it has been effective in raising the awareness levels on sustainability and CBFM, but translation of the awareness into concrete action has not taken full shape. Training was very significant for fishermen. It had some positive impact. Earlier, management action merely meant following instructions from the Government, but now there is a better understanding in the minds of the fishermen about joining hands with the Government for management of fisheries.

The Precautionary Approach to Fisheries Management Workshop in Medan was particularly good for policy-makers. It made them aware of the Code of Conduct for Responsible Fisheries (CCRF). A Workshop on CCRF was also planned during 1999. A Bahasa Indonesia workshop was also similarly held to expose fisherfolk to the concept of the Precautionary Approach & CCRF. Translation of the CCRF had started, and an amount of Rupiah 120 million (Rupiah 8,500 = US $ 1) for translation and distribution of the CCRF had been earmarked. The FAO was also being approached on this subject. The Central

Fisheries Research Institute and the Fisheries Department of the Bogor Agriculture University were to be involved in the translation.

Summing up, the DGF said that the project had been very useful. The Asian Development Bank's project on CBFM had originated from the community-based participatory approach adopted in the BOBP Project. The Government has just acted as a facilitator. The time-scale in which the project has operated could be considered as a limiting factor, and staff shortage affected the Project. It would be very good if the Programme were to continue, However, local budgeting would be difficult to come by due to the financial crisis in the country. It would have been better if there was a local representative or a national consultant to assist the project in day-to-day management. In future, the Programme should include a national expert.

DGF identified mariculture as an important programme to be promoted in Indonesia . Corals are being destroyed for ornamental fisheries, and mariculture can be a suitable alternative avocation for preventing the corals from destruction. A combination of public awareness, CBFM and enforcement can be useful in this direction. Mariculture is just beginning in Indonesia and it would be advisable to have some demonstration or pilot projects undertaken. The Mission was informed that Indonesia is also looking for donors for an Integrated Mariculture Programme (Integrated Coastal Area Management).

The new law in Indonesia empowers the local Government to manage the resources. Certain areas are already managed by the community. A legal framework for aquaculture is also being prepared. Concurrently, regulations for sea farming are required, and a master plan for sea farming could be spelt out. Seaweed culture supports small-scale fishermen and this activity could be extended. With zonation and better planning and provision of backward and forward linkages, fisheries management and production can be improved in the country.

The DGF strongly recommended the continuation of BOBP as a regional concept. "BOBP can be a short-cut to us for learning from other countries like Thailand, Sri Lanka, etc. BOBP is very much needed in the future, although the priorities can be discussed."

The Mission visited the Ministry of Agriculture/ADB Project on Coastal Community Development and Coastal Fisheries Resource Management in Jakarta and held discussions with the Project Director and other officials. This is a joint project (1998-2003) between the Government of Indonesia and the Asian Development Bank. The primary objective of the project is environment, the secondary objective is poverty reduction. It is a non-revenue project; the entire assistance received from ADB is in the form of loan. The inspiration for this Project has come from the BOBP. The Project co-operates closely with the Coral Reef Management Programme.

The Project seeks to tackle the problem of depletion of coastal fisheries resources, in the context of the pervasive poverty of coastal communities. The Project consists of two phases: a first phase of 1 to 2 years, a second phase of 2 to 5 years. The Project has networked with universities and NGOs. Major activities under the Project are resource assessment, socio-economic survey and market analysis. Local Project Advisory Committees have been set up. Post-harvest activities like use of ice, etc. are being strengthened to optimise fish production. The Mission suggests that activities under BOBP3 and the DGF/ADB should have strong linkages and the activities dovetailed so as to avoid duplication of effort.

The Mission met Dr. Mohammed Prakosa, acting Head of the FAO Mission in Indonesia. According to Dr. Prakosa, the BOBP activities in Indonesia have been very promising and in future it may be necessary to draw more stakeholders, such as universities, into the Programme. He was of the view that there are distinct advantages in a Project being regional, since the work done in other countries can be shared. BOBP could also involve itself in a more upstream policy issue. It could consider assisting the National Government in preparing the Deep Sea Policy. With more autonomy being given to the Provinces now, they would need more assistance in preparing their policies and development programmes, and the expertise of agencies like BOBP would be useful.

Dr. Prakosa suggested that FAO should be informed of developments at all stages. FAO is sometimes not aware of BOBP activities, since communication with the concerned departments is mostly direct. The Project in future should aim at strengthening national capacities and give more authority to the National Government in carrying out its activities. National Governments too should be stimulated to participate in the TORs to be prepared for any future programme. There should be an MOU between the BOBP and the National Government in the beginning to spell out more clearly what is to be done by each side. FAO will support further continuation of the Project.

In conclusion, the Mission is of the view that notwithstanding delays due to the political situation and difficulties in identifying and assigning consultants, considerable groundwork has been done, which has given DGF and BOBP a better understanding of the problems. The DGF is interested in the progress of activities, and has given high priority to solving the problems of mariculture, anchovy lift-net fishery and small-scale fisheries. Training activities have generated much interest. Stakeholders are aware of this Programme.

Linkages between DOF and the Provincial Government were felt to be "soft" in spirit as well as in the budget. The Fisheries Department in the Provincial Administration needs to be strengthened. The financial crisis the country has passed through has also constrained the project's performance in Indonesia. The Department could not handle the Programme in a better manner due to logistics problems. Involving NGOs could have helped project implementation. The Mission was informed that BOBP did try to involve some NGOs, but the effort did not fructify. Field level activities were affected by the economic and socio-political situation, and discussions are under way to figure out means of accelerating efforts to make up for lost time. However, the success of these efforts depends on circumstances beyond the control of DGF and BOBP.

Linking the Code of Conduct and Sustainable Livelihoods

By Ronald A Maine and Richard Coutts

The authors describe and discuss a new approach to development in fishing communities, the "Sustainable Livelihoods Approach." With funding support from the UK's Department for International Development (DFID), the FAO seeks to implement this approach in 25 countries of Africa where the DFID is working with fishing communities. The new approach will be linked with the Code of Conduct for Responsible Fisheries.

The Fisheries Department of the FAO is now the executing agency for the Sustainable Fisheries Livelihoods Programme (SFLP), funded through the United Kingdom's Department For International Development (DFID) and presently being implemented in co-operation with FAO in 25 countries of Western Africa. In this programme, Sustainable Livelihoods Approach (SLA) is being linked to the Code of Conduct for Responsible Fisheries (CCRF) for application in communities where fisheries contribute to the means of livelihood.

The SLA is a particular way of thinking about the development potential, the objectives and the priorities as these pertain to each fishing community. "A specific livelihoods framework and objectives have been developed to assist with implementation of SLA, but the approach goes beyond these. It is a way of putting people at the centre of development, thereby increasing the effectiveness of development."[1]

The CCRF is a voluntary Code which can be incorporated into national legal frameworks to provide a basis for national enforcement of practices designed to protect and sustain both marine and freshwater fisheries resources. The CCRF and its associated guidelines set out principles and international standards of behaviour for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity. In this way, the CCRF, in providing the basis for utilising aquatic resources rationally can make a significant contribution to the sustainability of livelihood activities carried out in fishing communities.

What is a livelihood? "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."[2]

These shocks or stresses may include any or a combination of the following:

- trends – meaning a prevailing tendency for some facet of the livelihood cycle to be changing over time; for this purpose, that change would be negative thus resulting in a stress on the activities supporting the livelihood means;
- shocks – normally taking the shape of a natural disaster such as a flood, typhoon, earthquake, drought, etc. but could include a regulatory shock due to a legal decree which results in a negative effect on the livelihood means;
- seasonality effect – a monsoon season which makes fishing difficult for small vessels, a migratory season when the primary stock is not on the fishing grounds, etc.

All points contained in the above three bullets would be classified as being part of the "Vulnerability Context" which is a major element of the SLA framework as it is assumed by the SFLP. This framework is demonstrated in Figure 1.

Starting from the left we find the box labelled "Vulnerability Context". As the diagram shows a link to the Vulnerability Context from the box labelled "Transforming structures and processes", which would include policy and regulations, we can consider that the Vulnerability Context would comprise the 'non-asset' constraints[3] to the livelihood system. The SFLP framework presents the vulnerability context as an up-front item to be considered early in initiating the sustainable livelihoods approach. Initial understanding of the shocks and stresses that a community may have to face is important to the development of livelihood strategies and will help to mitigate the devastating effect that shocks can have when they impact a community that has not undergone any attempt to develop appropriate coping strategies or at least awareness-raising with regard to the potential danger.

Moving on into the framework, we meet the pentagon depicting the "Livelihood Assets". These being Human, Social, Physical, Financial and Natural resources comprise the assets usable by the community in attaining livelihood goals. The lack or insufficient quantity of any one or more of these assets would give rise to a situation where, if left uncompensated, would comprise a substantial constraint to attaining livelihood goals. It is for this reason that the asset inventory is taken at an early

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[1] DFID Sustainable Livelihoods Guidance Sheets.

[2] DFID Sustainable Livelihoods Guidance Sheets, quotation adapted from Chambers, R. and G. Conway. 1992. Sustainable Rural Livelihoods: Practical concepts for the 21st century. IDS Discussion Paper 296. Brighton: IDS

[3] A non-asset constraint would be a constraint that is not composed of a lack of some livelihood asset such as financial, natural or human resources.

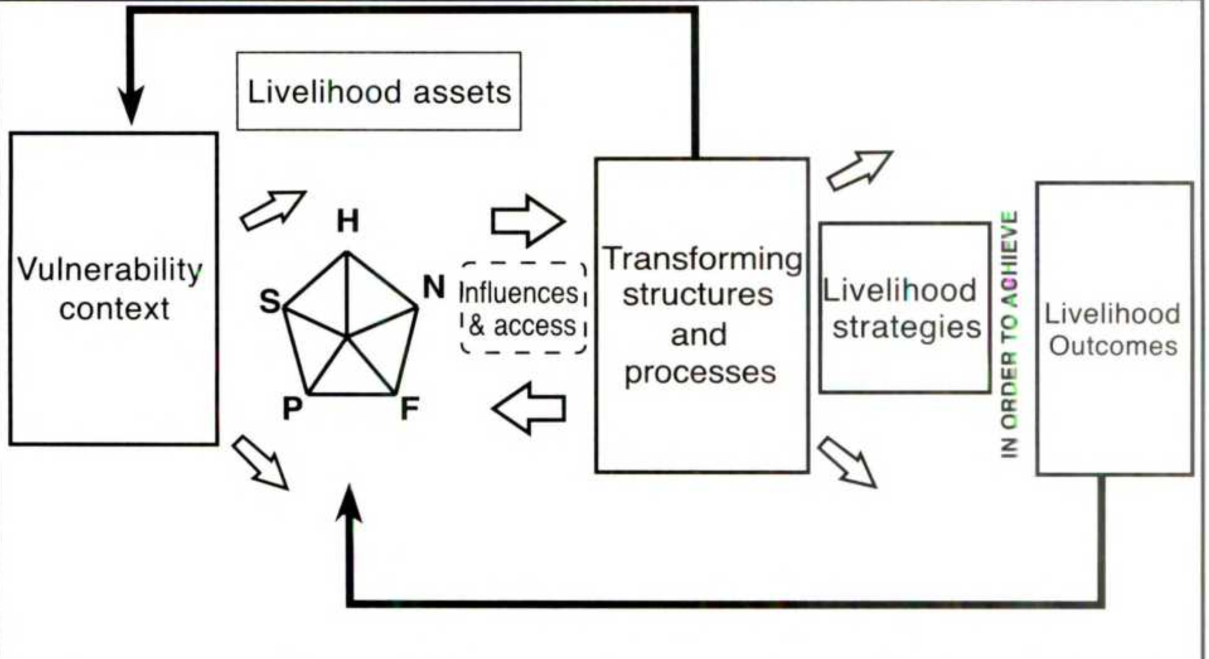

Figure 1: The Sustainable Livelihood Framework consisting of the five major elements included in the SLA model.

Note: Legend for the Livelihoods Assets Pentagon

H = Human Resources (workforce, skills, knowledge, etc.)
S = Social Resources (social, cultural, religious)
P = Physical Resources (equipment, boats, buildings, etc.)
F = Financial Resources (income sources, credit, banking)
N = Natural Resources (fish stocks, forests, potable water, arable land, etc.)

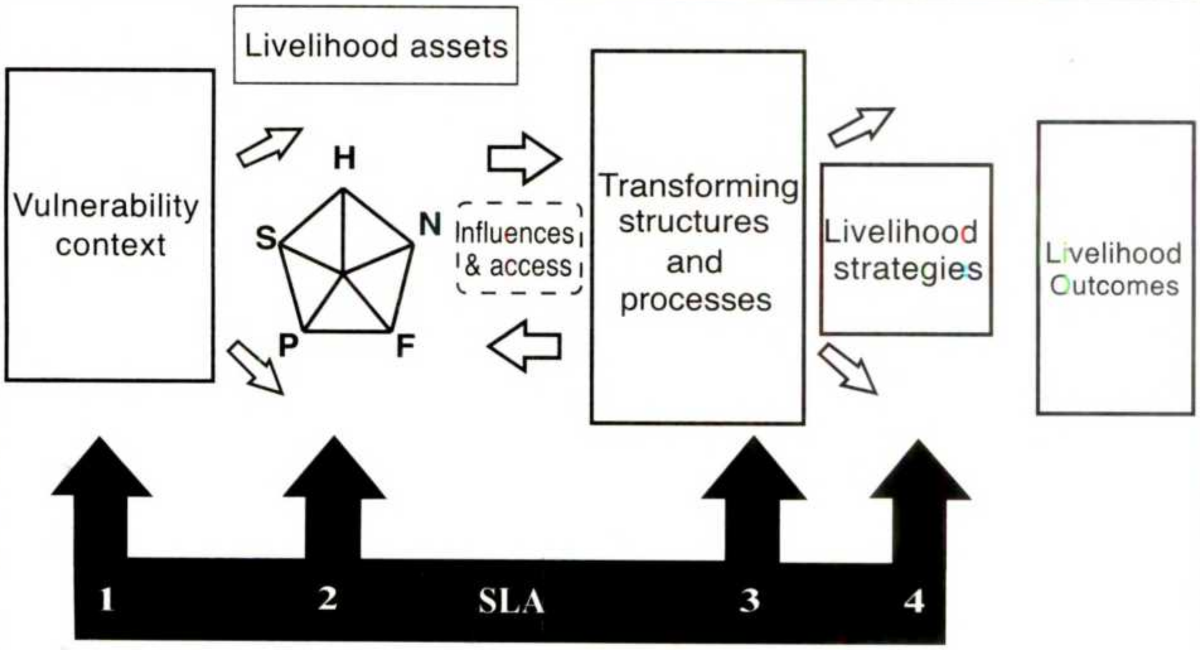

Figure 2: Intervention Points of the Sustainable Livelihood Approach with points 2 & 3 being the most effective entry points for SLA.

stage, before strategies are developed, thereby working to prevent community members following a favoured strategy that has no chance of success due to the lack of a particular prerequisite.

Our next element in the framework is the block entitled "Transforming structures and processes". Here are contained all of the potentials for both support and impediment that may result in policy, regulatory systems, legal frameworks and institutions that are or may be put in place by government, private sector or the cultural society. These may have a negative effect on the ability of a community to make the best use of its assets in the development of effective livelihood strategies. However, they also represent an area where enlightened inputs can make the greatest contribution to bringing about alterations in policy and practices, thereby allowing the formulation of livelihood strategies appropriate to the conditions at hand and the potentials within reach.

The "Livelihood Strategies" themselves, being the next item as we move to the right in the framework, represent a dynamic planning paradigm that is constantly testing the supporting or restricting conditions. The successful orientation of the livelihood strategies requires a continual monitoring of the elements in the framework, "Vulnerability Context", "Livelihood Assets" and "Transforming Structures and Processes" which have been assessed prior to arriving at the point of developing strategies. This process of monitoring, reassessing and making adjustments to the livelihood strategies is a never-ending process. Should these actions fail to be taken, and a stagnant situation be allowed to develop, the potential for the failure of any particular livelihood strategy is greatly increased.

Looking at the SLA framework, it is possible to identify the major areas of potential impact that can be realised by the SFLP as it is implemented. These points are indicated in Figure 2.

As can be seen, there are four intervention points. However, points 1 and 4 are being represented by a slightly less dense pattern as those points have a lessened potential for impact than do points 2 and 3. In any event, it is important to remember that SLA is an evolution of the participatory development process, that has been taking root over the past twenty years, and primarily targets people and communities.

The SFLP is in fact a programme that links the Code of Conduct for Responsible Fisheries (CCRF) to SLA. The purpose of establishing this linkage is to provide a basis that will allow those communities dependent on marine and freshwater fisheries resources to develop livelihood strategies that will be in line with eventual responses from the "Transforming Structures and Processes" as governments and societies undertake the implementation of the CCRF. In this context it is important to recognise the basic differences in the two processes, SLA and the CCRF, which are being linked.

> *"The individual livelihood strategies therefore tend toward sustainability as they are based on the CCRF where appropriate and the CCRF becomes a functional reality as it is incorporated within the strategies. It is a good partnership."*

In contrast to the SLA, which we said targets people and communities, the CCRF is primarily aimed at governments and the various processes that control the exploitation and utilisation of marine and freshwater fisheries resources. In that respect the CCRF has a much more limited impact range than does the SLA. The prevalent statements in the CCRF begin with the phrase "States...." or "States should .....". This appears in 16 of the 19 general principles, and regulatory action is implied in the other three. The CCRF and its implementation is of extreme importance to the survival of the fisheries sub-sectors and to small-scale fisheries in particular. In this regard, it must be realised that management measures are much easier to establish and enforce on an industrial basis where one has a smaller total number of operators, than on an artisanal or small-scale basis where there are large numbers of operators from diverse coastal areas, all in direct competition with each other and the industrial fleet. Consequently, the CCRF is a tool designed for States to adapt and implement on a national basis. To look at how the CCRF will be able to intervene at the grassroots level reference can be made to Figure 3, below.

From Figure 3, the direct entry point, through national institutions, government, private sector, etc. can be easily seen. There is of course the opportunity for indirect intervention at the local level but this is after the CCRF has been adapted and interpreted for local implementation by national systems of a higher order. Of great importance in this partnership between SLA and the CCRF is the fact that SLA provides a framework for delivering the CCRF to the local level in a manner that will integrate the CCRF with other local priorities to be considered in developing effective livelihood strategies.

A graphic depiction of how the whole system can work is shown in Figure 4. The various direct support and feedback loops existing within the SLA framework are combined with the single direct CCRF input point and the interventions of the "Transforming Structures and Processes" as they respond to CCRF input. The CCRF as a package has been designed for a programme of national implementation comprised of locally executed activities. The Sustainable Livelihoods Approach allows those local activities to take place and employs the results as a direct input to the formation of livelihood strategies. The individual livelihood strategies therefore tend toward sustainability as they are based on the CCRF where appropriate and the CCRF becomes a functional reality as it is incorporated within the strategies. It is a good partnership.

Note: The authors acknowledge that the figures included in this article are taken either directly, or in modified fashion, from various DFID Publications on SLA or from work prepared for the DFID/FAO SFLP by Jock Campbell, DFID/FAO consultant.

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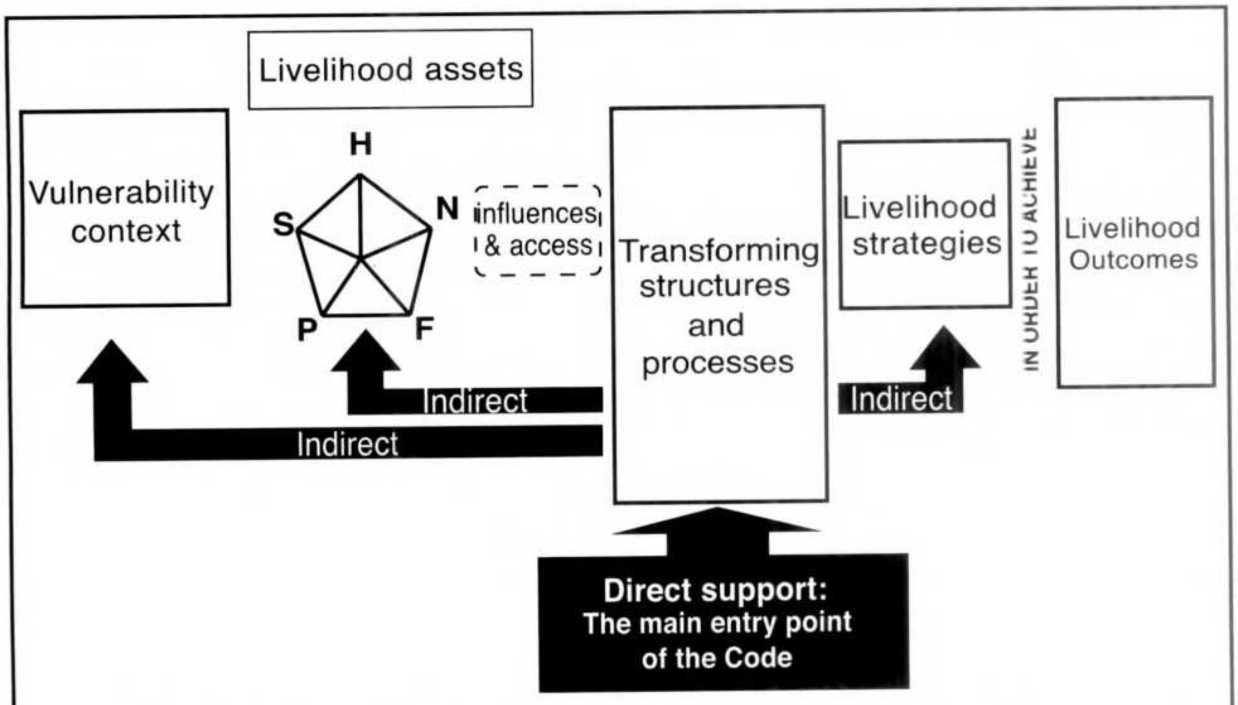

Figure 3: The SLA Framework and the single Entry Point of the CCRF. The paths for interventions from "Transforming structures and processes" as a result of CCRF inputs are indicated by the grey paths marked 'indirect'.

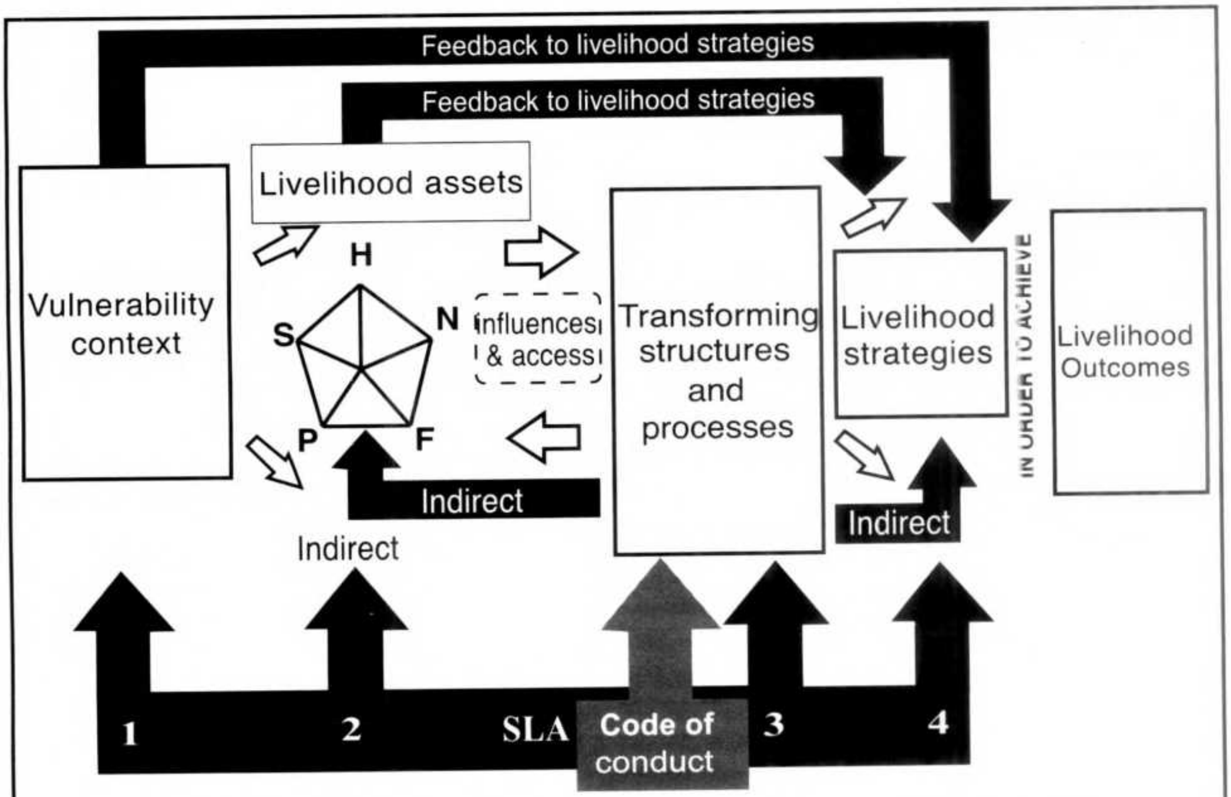

Figure 4: The combined elements of the SLA and the CCRF at work, including the SLA feedback paths from the Vulnerability context and the Livelihood assets to the Livelihood strategies. These feedback paths carry inputs, resulting from both SLA and CCRF interventions, to the Livelihood strategies. This provides the basis for adjusting grassroots activities in accordance with changing constraints and asset conditions as they affect the local potential for achieving desirable Livelihood Outcomes.

Some Thoughts on Coastal Community Development and Fisheries Resource Management in Indonesia

by Suseno

The author outlines some of the problems that afflict fisherfolk and other coastal communities. He says that solving these problems requires concerted effort on the part of experts and individuals outside fisheries. He discusses the work of an ADB-supported project in four provinces of Indonesia that mobilizes such effort.

Coastal areas are critical for the management of fisheries resources. It is estimated that about 90% of the world fisheries production depends on coastal habitats (FAO, 1997). But these habitats are fast degrading. The World Resource Institute (WRI) reports that in 1996, 34% of the world's coasts risked degradation.

The development of people-oriented fisheries – particularly when it relates to the welfare of the coastal community – requires the support of non-fisheries individuals, NGOs and development organisations. The active and proactive participation of anthropologists and sociologists is a *sine qua non.* Such participation should include research – not merely on marginalised coastal area communities but also on those who have marginalised them. In other words, scientists should take part in the process of policy-making, decision-making and implementation. Their participation will encourage development in harmony with the values of the coastal community, particularly those of fishermen.

Fishermen and development

Fishermen generally live in remote coastal areas difficult of access, which are densely populated. A recent survey says that some 56% of the coastal community consists of fishermen. Half of the respondents said they are content with their occupation.

The fishermen are so far from power and communication centres that they are unaware of day-to-day developments. They feel marginalised. They are powerless against the onslaught of new economic products, new technologies and policies which threaten them with competition.

Fishermen are accused of causing environmental damage and generating conflicts. But it is often the fishermen who end up as victims of others' actions. Examples are sea oil spills, estuary and inland industrial waste, etc.

Rapid changes are sweeping away the innate values of fishing communities. While their fish catch is decreasing, hope is diminishing. Their motivation to fish, their self-confidence, their livelihood, their fishing methods, are all under threat and challenge. Why has change occurred so fast?

The Four Paradigms of Development

The social needs of fishermen do not get enough attention. More attention is paid to macro-economics and politics than the specific needs of fishermen. As for their economic needs they are dealt with commercially. Fishermen who do not have collateral, find it hard to get loans. Politically, the authorities are more concerned with production of food than the productivity of the fishermen, which suffers neglect. This approach leads to investment on research and on new technology to produce food efficiently. Eventually, the role of human beings in the production process is replaced by machinery. This reduces work opportunities for fishermen.

Fishermen are now competing with one another to access fishing grounds and capture ever-diminishing fisheries resources. They should be helped to adjust to change, to the erosion of traditional values and to the impact of new technologies and policies.

There are four major paradigms used to analyse under-development: the technology paradigm, the economic paradigm, the structural paradigm, the value paradigm (A.G. Flor, 1999).

The technology paradigm: is based on the belief that the west became rich on account of modern technology. The root cause of poverty is the absence of technological know-how in developing countries.

The economic paradigm: Poverty or development lag is caused by the absence of competent government fiscal or monetary policies.

The structural paradigm: is based on the radical view that poverty is a function of the social structure. The only solution to eradicating poverty is to change the system of government. The structural paradigm divides the elite and the common people, the central government and the local government. A conflict of interests exists, so does harmony of interests. The expressions "top down" and "bottom up" emanate from this paradigm.

The value paradigm: is based on the view of some anthropologists and sociologists that poverty is a function of cultural and social values. For example, 10 years ago the Asian tiger economies (i.e. Singapore, Taiwan, Korea, etc) had predominantly Chinese populations influenced by Confucian teachings. The countries that lagged behind were predominantly Malay (i.e. Malaysia, the Philippines and Indonesia).

I believe that the application of these paradigms must take note of and include local conditions and sensitivities. Those who know most about local conditions and sensitivities are the local people (including local community organisations and the government). It seems that the most suitable paradigm is a combination of all four paradigms in the context of the local environment.

Coastal Fisheries

Seventy per cent of the fishing fleet in Indonesia is devoted to small-scale fishing activities. Small-scale craft are confined to coastal areas because of constraints on technology, fishing capital and skills. The large number of fishing craft raises the prospects of resource conflicts and resource sustainability.

The Directorate General of Fisheries has been a development partner with BOBP since 1985. The Programme has sought to develop fisheries in co-operation with the local coastal community. The ADB-supported Coastal Community Development and Fisheries Resources Management Project or Co-Fish, started in 1998, is based on the same concept as the earlier BOBP-supported Coastal Fisheries Management Project in Indonesia. The new project operates in four provinces – Riau, East Java, Central Java, West Nusa Tenggara. It has two main aims – improving the environment and reducing poverty. Activities include:

(i) promoting community-based management of coastal resources

(ii) increasing incomes and improving the living conditions of coastal fisherfolk including the social infrastructure

(iii) promoting alternative income-generation activities such as small-scale enterprises

(iv) rehabilitating physical fisheries facilities

(v) strengthening the capabilities of the coastal community, NGOs, co-operatives, associations and government agencies concerned with coastal fisheries resources.

These agencies include the Directorate General of Fisheries, and the Provincial and Regency Fisheries Offices. The project pays special attention to the role of women in the development of the coastal community.

In the four project locations, coastal fisheries resources have been under serious threat. In addition, 44 per cent of fishermen's households suffer from pervasive poverty (ADB, 1997). The damage to coastal habitat has the following consequences: loss of food productivity and food security; pollution of fisheries products; decrease in economic viability; increase of conflicts between fishermen; loss of trading opportunities. The restlessness of the people has generated conflicts and physical violence.

The project adopts the following approaches:

(i) *participatory* – helping coastal communities to organize themselves (in co-operation with local institutions), identify their specific needs, plan and implement the management of fisheries resources and create business programmes appropriate to the specific needs of the local coastal community.

(ii) *flexible implementation* - alternative approaches based on the needs of local coastal communities.

(iii) *capacity building* - increasing the competence of local or national government institutions in the fisheries sub-sector as well as local organizations and the coastal community, thus meeting the development needs of the coastal community.

"Fishermen should be helped to adjust to change, to the erosion of traditional values, and to the impact of new technologies and policies."

(iv) *establishing closer co-operation and coordination* - between local and national government institutions, and local community organizations.

A participatory resource and ecological assessment (REA) exercise is being undertaken to prepare local area management plans and coastal resource management plans in the project's four locations. These activities are carried out in co-operation with local universities and local contractors. The main objectives are to provide information describing the status of resources, increase community awareness of fisheries resources and their rational use, establish a detailed information base to update the area management plan and evaluate critical issues and problems related to management of coastal resources. This is done through rapid site surveys, participatory workshops, and REA field studies. Data collected under the REA exercise will cover coral reefs, sea grass beds, and mangrove forests, monitoring of water quality, assessment of fish supply and data on fish capture.

In the area of Socio-Economic Assessment (SEA), also a part of RRA, the expected outputs are:

(i) baseline data on the economic and demographic profiles of fishing community

(ii) baseline data on the social and cultural activities of the fishing community

(iii) documentation of existing legal and institutional structures in the fishing community

(iv) inventory and assessment of potential alternative or supplementary livelihood opportunities

(v) pre-feasibility study for employment-generating projects/economic opportunities and micro-credit schemes and

(vi) recommendations on coastal resources management, including the establishment of local laws related to coastal resources management.

Conclusions

World fishing is characterised by rising demand and falling supply of fish. Ninety per cent of the world's marine fisheries production depends on the coastal habitat. Thirty four percent of the world's coast is degradation-prone, while 17% faces moderate risk of degradation.

Coastal areas pose management problems – because of resource conflicts and fish hunting based on open-access fishing. Increase in coastal populations will further stress coastal communities.

People outside fisheries – anthropologists, sociologists, NGOs, international organisations – must play an active and proactive role to attack the poverty of coastal communities. They should carry out research not merely among marginalised communities but also on the process of decision-making and implementation.

All four paradigms of development – technological, economic, structural and values – should be probed to deal with the root cause of underdevelopment.

The primary objectives of the ADB-supported Project for Coastal Community Development and Fisheries Resource Management are to:

(i) promote sustainable management of coastal fisheries resources; and

(ii) reduce poverty in coastal areas. These objectives can be successfully achieved only with the active participation of all parties concerned with the development of the coastal community and the management of coastal fisheries resources.

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Small-scale fishers operate 70 per cent of Indonesia's fishing fleet.

Documentation of Learnings - Malaysia

By Raja Mohammed Noordin bin Raja Omar
Department of Fisheries, Malaysia

Three types of activities were assisted by BOBP in Malaysia during the Third Phase.

a. The Special Area Management Plan for the Pulau Payar Marine Park, a local-level activity.

b. Coastal Fisheries Management, a national-level activity.

c. Miscellaneous Projects

The Special Area Management Plan (SAMP) for Pulau Payar

To help implement the Department of Fisheries, Malaysia (DoFM) / BOBP's Third Phase, a Situation Analysis was undertaken in Malaysia in 1994. It identified several factors that have contributed to degradation of coastal resources – including destruction of mangroves for various uses, siltation, sedimentation, agricultural development, rapid expansion of tourism, and destruction of seagrass beds and corals reefs. It recommended that the Programme emphasize marine parks as productive ecosystems enriching fisheries and biodiversity.

The Pulau Payar Marine Park, near Langkawi island off the coast of Kedah state, was identified for a pilot activity. It was to enable development and testing of methods and approaches to improve the management and conservation of marine parks. A Special Area Management Plan (SAMP) was to be developed for the park, for the benefit of all stakeholders of the area.

The project was meant to start in 1995 but it took off only in 1996. Yet, the project managed to carry out many activities, providing results useful in formulating a management plan.

Activities carried out under SAMP:

a. Training, including DoFM staff and scuba training of fishers/fisherfolk.

b. Organizing local Coastal Zone Management workshops in Kedah, aimed at establishing a consensus on objectives and issues.

c. Developing a SAMP for Pulau Payar Marine Park. This entailed additional collection of scientific data, socio-economic studies, determining the "carrying capacity" of the park, establishment of committees, and a final SAMP draft.

d. Implementing management strategies in SAMP which included organising a local workshop (to adopt the final SAMP); presentation of SAMP to the State Executive Council and government; development of education/information materials; dissemination of information; education and training of fisherfolk.

e. Getting feedback and assessing lessons learned from SAMP development and implementation.

f. Proposing a national Integrated Coastal Area Management framework.

Coastal Fisheries Management

Coastal Fisheries Management was considered a programme that could support a national integrated coastal area management programme. This category was initiated in 1997 in the course of implementation of SAMP. Two workshops were planned.

a. Orientation Workshop on the Precautionary Approach to Fisheries Management (PA2FM)

b. Stakeholder Approach to Fisheries Management.

Miscellaneous Projects

These included activities in which the DoFM officials had taken part at regional forum, and national-level activities that were planned but were yet to start.

Project Implementation

a. The Special Area Management Plan

This was the largest BOBP-assisted project, involving many sub-projects. The aim was to determine whether the marine park under the fisheries and eco-tourism management regime could increase the fisheries resources in the vicinity of the protected areas or sustain them at existing levels.

The project started by compiling data on the status of the marine park, to determine issues that could bring about a better management plan. The following planned activities were implemented:-

(i) (a) Two officers were assigned to attend the Summer Institute in Coastal Management at the University of Rhode Island, USA, from 3 to 28 June, 1996. Only one attended. The course would teach and train participants on how to determine issues in coastal zone management, and how to plan and implement a programme to address the issues (b) Ten fishers were given training in diving during 8-12 December 1996, and received diving cards. The course gave fishers who wished to leave the fishing industry an opportunity to do so, thereby reducing fishing pressure in the park.

(ii) The planned coastal zone management workshop was successfully conducted on 20-22 October 1997. Many officials from the relevant state and federal departments attended. This workshop provided the participants with the findings of the scientific and socio-economic characterization studies mentioned below.

(iii)Sub projects included (a) carrying capacity assessment of the Pulau

Many activities were carried out at the Pulau Payar Marine Park to test methods and approaches to improve management and conservation of marine parks.

Payar Marine Park (b) hydroacoustic survey of the marine park area (c) socio-economic studies of the fisher community in Kedah state. These sub-projects sought to fill in gaps, update information or add to available knowledge. The carrying capacity study was implemented by the Worldwide Fund for Nature, Malaysia (WWF Malaysia), from 28 May 1996 until 30 September 1996. The hydroacoustic survey was conducted to provide a mapping of the underwater biodiversity in the marine park area.

(iv) Establishment of the Tier I Committee: The Marine Park Council has agreed to function as the Tier I Committee. This council is chaired by the Secretary-General of the Ministry of Agriculture. This committee will yet implement and monitor projects and eventually present SAMP to the next level committee known as the Tier II Committee. This committee will include members of the State Executive Council that will evaluate SAMP and decide on the recommendations made.

b. Coastal Fisheries Management

Two workshops conducted during 11-14 August 1997 were found to be very informative. A possible spin-off project arising from the workshops was the inception of the Community-Based Fisheries Management (CBFM) project of the Selinsing mangrove mud-crab fishery. It aimed at managing the mangrove mud crab at a sustainable level. Prior to the start of the project, the landings of mud crabs had dwindled. The cause was found to be the rampant catch of berried crabs. This project started in January 1999. It will go on till 2000 A.D using funds from DoFM.

c. Miscellaneous Projects

DoFM officials took part in a Regional Workshop on Monitoring, Evaluation and Impact Assessment for Fisheries Development and Management. It was held in Sri Lanka from 23 to 26 March, 1999. During the course of the workshop three projects were planned.

(i) A National Workshop on Monitoring and Evaluation of the Fisheries Planning and Management System.

(ii) A National Workshop on the Implementation of the Code of Conduct for Responsible Fisheries.

(iii) An International Workshop on Marine Protected Areas.

Project Implementation: Assessment and Lessons Learned

A questionnaire was distributed to all those who had taken part in BOBP-assisted projects, mainly to obtain feedback about these projects.

Project Management

(i) A visitors' survey on the perceptions of the Pulau Payar Marine Park was conducted through interviews and questionnaires, along with the literature review and desk research relating to carrying capacity determination. Before any decision and action are taken on the basis of the survey and the literature review, all aspects of visitor management should be considered. Consultations with stakeholders, particularly the State Government, are vital. Any awareness programme should be continued. It would be useful to determine the number of visitors to the park (Lim Li Ching, WWF, Malaysia).

(ii) Officials from NGOs and universities, apart from the DoFM, could provide more suggestions and perhaps assist in resolving major issues arising from the projects (Zulfigar Yasin, Universiti Sains Malaysia).

(iii) More in-depth discussions should be held at the planning stage. The project should be more cohesive so that the direction is clear. This will strengthen team spirit, and enable team members to realise the action to be taken. Inputs are needed from all participants. The project should emphasise the relationship among members. They should share problems, objectives and vision (Chee Phaik Ean, Fisheries Research Institute of the DoFM).

(iv) Workshops held on ICAM have instilled awareness in DoFM officials about the potential of Community-Based Fisheries Management (CBFM). It was believed that CBFM would be more successful in areas where conflicts between fishers using different gears were very few. (Ali Ismail, Corporate Planning Division of DoFM). It was proposed that an advanced workshop be held to include local fishers and society. This participatory stakeholder consultation and analysis was completed during 13-15 February 2000. A pilot project should be initiated on CBFM. As for the workshops on coastal fisheries management, information on sustainable management of mangrove mud crab is perhaps still insufficient.

(v) The Regional Workshop on Monitoring, Evaluation and Impact Assessment (held in Sri Lanka) was a success because of active participation and a topic relevant to current issues. Resource persons were available for guidance. The participants showed keen interest and displayed positive learning attitudes. Lessons from the workshop: (i) Project development planning and implementation must involve the target groups (ii) Any development must first be planned and for more effective implementation, be monitored (iii) The objectives of management and development must always be emphasised. (Ahamad Sabki Mahmood, Corporate Planning Division of DoFM).

Manpower and Human Resource Training

(i) The Summer Institute Course was timely. As most participants were involved in coastal zone planning and development, there was a fluent exchange of ideas, information and experiences. Officials who took part in the course are in a better position than others to undertake a coastal management project in fisheries.

(ii) All 10 fishers who worked as crew of local fishing vessels were trained under the SAMP activity. They are now dive guides in the boats of tour operators. This activity has given fishers the opportunity to use the marine park to increase their incomes. They have also become diving buddies for hotel guests.

(iii) The high staff turnover at both national and state levels has delayed project implementation. It has resulted in additional time being taken up by staff to familiarise themselves with projects. Four senior officers held the post of project coordinator within the third phase.

(iv) Often, a single officer has to implement two or more projects. The DoFM could contract out the job, but then it would lose the experience it would otherwise gain.

Financial Arrangements

(i) The BOBP/FAO office provided banking facilities, but these were not utilised because of the reporting formalities they entailed.

(ii) Having a Marine Park Trust Fund was an advantage – it made management of funds much easier. But it is time-consuming because purchase procedures must still be governed by the government manual.

General Comments

(i) All officials involved in project work should use accepted project titles. A profusion of project titles, some coined by those receiving documents, is bound to be confusing. Even officials who were implementing projects seemed confused.

(ii) Too many projects were implemented in a short time. An effective procedure would be to start a new project only after earlier projects have been successfully implemented.

(iii) Activities were proposed and imposed by managers in a top-down manner, without due consultation with stakeholders. It was assumed that they would benefit fisherfolk. In such a set-up how could a joint-management plan be conceived, accepted and implemented with commitment?

(iv) It will help if project participants get an advance against their allowances. This will help them meet their daily subsistence needs.

Conclusion

It is now time for all fisheries stakeholders to meet and openly discuss the fate of the resources and their own interests that are at stake. There is a need to compromise on contentious issues and agree on common matters so that sustainable management of resources, both on land and in the sea, may be achieved.

It would be ideal if representatives of all stakeholders in the fishing industry take part in all stages of projects, starting from planning and inclusive of monitoring and evaluation. This way the project will effectively achieve its objectives, and the process of decision-making will be shortened.

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Video Film on Code of Conduct for Responsible Fisheries

The BOBP has made a video film to promote the Code of Conduct for Responsible Fisheries (CCRF). The 20-minute film carries brief interviews with the Tamil Nadu Director of Fisheries, Mr. Ansar Ali, and BOBP Director Kee- Chai Chong about the CCRF. But it is based mainly on a road show and street plays staged recently in several fishing villages of Thiruvalluvar and Kancheepuram districts in Tamil Nadu by the Department of Fisheries (DOF) with BOBP support. The DOF engaged a Chennai dramatic troupe to organise the play after briefing the troupe about the CCRF.

The play is set in a fishing village. Its messages about CCRF are conveyed through an educated and enlightened fisherman, who is the play's central character. The messages are woven into a story that is strong on song, dance and entertainment.

Predictably, the play attracted large audiences wherever it was shown – Gunankuppam, Thirumalai, Ennore, Kathivakkam, Kothivakkam, Perianeelangarai, Injambakkam, Kovalampakkam, Mahabalipuram, Sadraskuppam and Kanathur Reddikuppam. The audience included children, men and women, all of whom had a great time. They seemed to identify themselves with the fortunes of the play's characters; they hugely enjoyed the play's funny moments, the songs and the dances.

DOF officials and BOBP agreed that nothing can match street theater as a medium of communication with rural populations.

Miscalculation causes sea turtle deaths

By Aaron Davis and John Tuohy

Miscalculation by US marine regulators may be responsible for the deaths of thousands of endangered sea turtles, a National Marine Fisheries Service study has found.

The study recently concluded that the service's own mistakes in designing turtle safety chutes for shrimping nets has allowed more of the endangered turtles to drown than anticipated.

But what the government has in mind to save more turtles could drive some shrimpers toward extinction. The agency wants shrimpers to widen their nets' safety chutes, which already cause them to lose 15% of their catch. Shrimpers say enlarging the Turtle Excluder Devices will reduce shrimp harvests even more, possibly knocking some of them out of business.

"If it is a significant change, it could be a big blow to the shrimpers," said Jerry Sansom, president of Organized Fishermen of Florida. "They already make as many runs as they can, and some are barely getting by."

Scientists think shrimp nets contribute heavily to a declining leatherback population. Worldwide numbers of the species have dwindled from 115,000 to 22,000 during the past two decades.

The safety chutes, introduced in 1987, were supposed to save 97% of the turtles in shrimpers' paths. Researchers now say the openings were made too small and save less than half the larger species of turtles.

A three-year study of thousands of turtle carcasses found nearly 40% were too large to exit the current safety chutes. Autopsies conducted on some turtles further bolstered researchers' claims by showing many of the turtles had drowned – a fate most common to run-ins with shrimp nets.

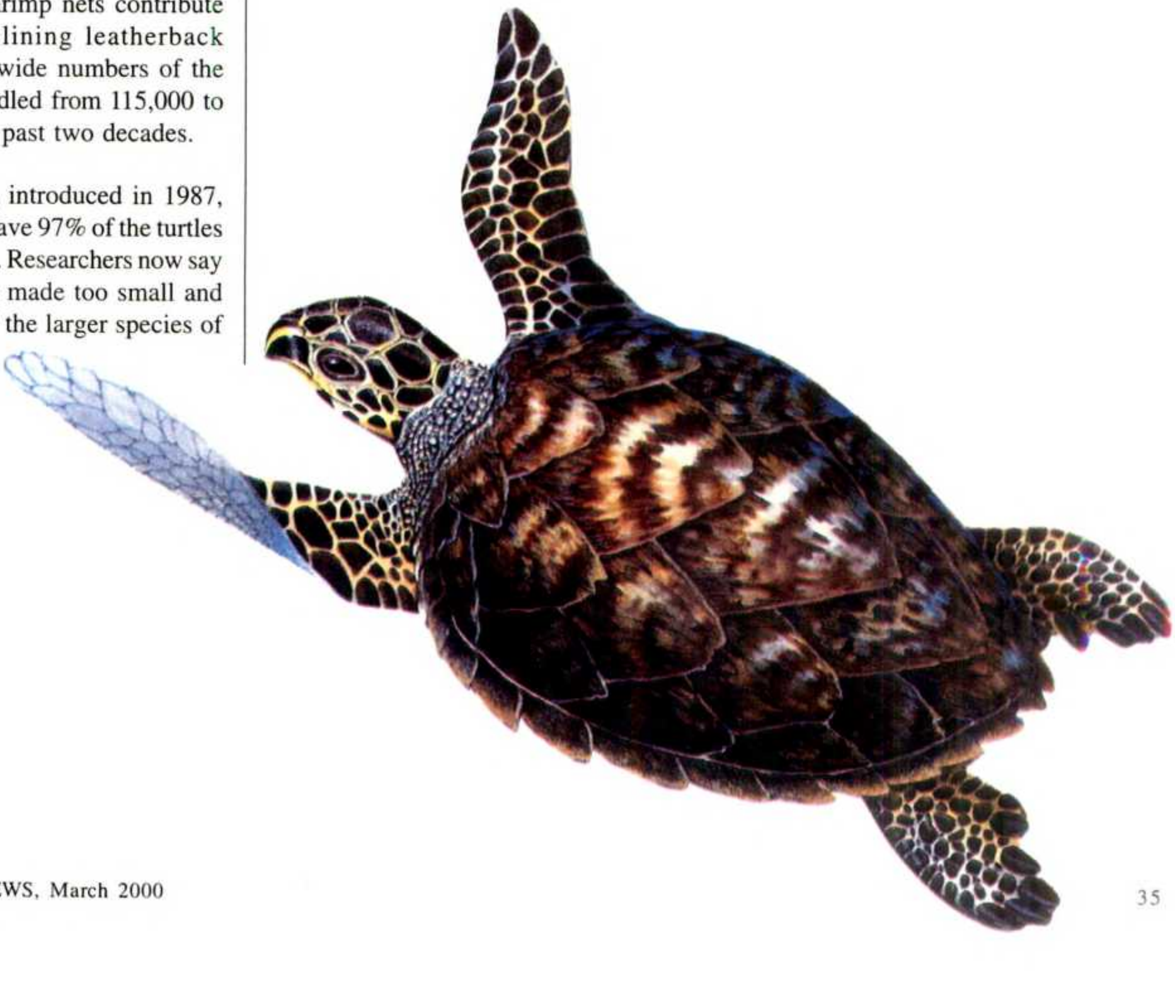
The chutes are sewn into shrimp nets to give turtles a way out before they are entombed with the catch. But thousands of turtles grow too large to make it through the chutes and others simply can't maneuver through the devices as designers had thought they could.

The leatherback can grow to 1.8 m in length and weigh up to 900 kg, about the size and shape of a Volkswagen Beetle.

Essentially regulators did not account for the height of some turtles, they say, meaning 30% to 40% of the loggerheads they had planned on saving do not fit through the current openings.

"For years, we only measured the length and width of turtles," said Llew Ehrhart, a sea turtle expert at the University of Central Florida in Orlando. "Only in the last couple of years have we realized how important the depth measurement is to their ability to escape the nets."

The Marine Fisheries Service's 31-page report concluded that "to decrease the mortality on large turtles caused by trawling, the opening dimensions of TEDs (Turtle Excluder Devices) need to be larger." – **Courtesy : USA Today.**



Forefather of the fishing trade

How the fishing trade started

An old Chinese story with a moral : Fish with restraint

The Chinese are said to be descendants of a dragon which, according to Chinese legend, was none other than the master of man – Fuxi.

He was the son of a woman named Huaxu and the Thunder God. Fuxi was strong, brave and intelligent. He was, therefore, admired by the people.

One day, a strange tree grew from the earth. It grew rapidly and soon touched the sky. The tree had no branches or leaves.

Said an elderly man: "This is the ladder to Heaven, but only a special man can climb up the tree and come back as master of the human race."

Fuxi wanted to give it a try so up he went. No sooner had he climbed a few steps then he fell.

Undaunted, he started climbing again.

From the ground, he resembled a dragon rising into the sky. Finally, Fuxi reached Heaven.

After spending some time there, Fuxi returned. Seeing him, the people went down on their knees to greet him. Since then, he has been revered as the master of the human race.

Having visited Heaven, Fuxi devised a *Bagua Diagram* which could outline the changes in the elements. From then on, man could predict or explain events.

The human race, at that time, did not know how to farm. When food became scarce, a famine was imminent.

Deeply concerned, Fuxi tried hard to look for other sources of food.

One day, it occurred to him when taking a stroll along a riverbank, that one source could be in the water. He dived into the river and was delighted to find fish swimming in it. He caught a huge carp and ate it. It was sweet.

He, therefore spread the news happily among his people that when anyone was hungry, he could fish in the river.

This, of course worried the sea animals. They sought help hastily from their sovereign, the Dragon King. The king was infuriated and approached Fuxi for an explanation.

"If your people continue to fish," the king said, "I'll flood the land with water and drown all of you".

Fuxi, however, as son of the Heavenly Dragon, was not intimidated.

"If you do that, I'll stop heaven from raining and dry up all the lakes and seas. You'll be sorry then," he replied.

The incensed Dragon King lunged at him and Fuxi turned himself into a dragon to meet his attack. They fought bitterly on land and in Heaven, and eventually went to see the Jade Emperor.

The Emperor, however, was not keen to hear their dispute. He ordered both of them to be beaten 50 times before he passed his verdict.

"I don't care who eats whom. This is very common on earth," the emperor said.

"If man likes to eat fish, let him do so. It is none of the Dragon King's business. However, since man belongs to the land, he may fish so long as he doesn't use his hands," he added before sending the two back to Earth.

The Dragon King was pacified. "Without using his hands, man will not be able to fish," he told himself, and returned to his palace with a sigh of relief.

Fuxi, on the other hand was baffled. If man could not fish with his hands, what could he do to supplement his food supply?

He then saw a spider weaving a web on a branch. This gave him an idea.

He wove a net with vine and twigs and placed it in water to see if it could trap fish. It worked! In fact, this was a much better way than using one's bare hands.

Without breaking the rule laid down by the Jade Emperor, man could fish again. The Dragon King was speechless.

Fuxi taught his people how to use the net and they were elated.

The sea animals again went to the Dragon King for help. But there was nothing he could do.

"I can't help you this time," he said.

The fish and prawns were so infuriated that their eyes protruded.

The fishing trade was established. As the use of fishing net was designed and promoted by Fuxi, he has been revered as the forefather of the fishing trade.

The angry Dragon King, however, waited for opportunities to take revenge.

He could not do a thing if humans fished with nets from the shore. However, if they used their hands or fished from the boats, he could create huge waves to drown them.

The fishermen, therefore, had to be extra careful. Casualties were, unfortunately inevitable.

It was for this reason that fishermen worshipped the Dragon King to beg for his mercy.

He was even thought of as a "part-forefather" of the trade. – *Legends of Forefathers of 72 Trades, translated by Zhoa Jianzi.*

BAY OF BENGAL NEWS

Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional multi-agency fisheries programme which covers seven countries around the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The programme plays a catalytic and consultative role: it develops, demonstrates and promotes new methodologies, techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in the member countries. The BOBP is sponsored by the governments of Denmark and Japan, and by member governments in the Bay of Bengal region. The main executing agency is the FAO (Food and Agriculture Organization of the United Nations)

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One of the matters uppermost in the minds of people who have been associated with the Bay of Bengal Programme (BOBP) is whether it will develop as an Inter-Governmental Organization (IGO) to meet the growing needs of the coastal fisheries in the Bay of Bengal (BOB) region – or end up as a page in the annals of history.

The Documentation of Learnings of the Third Phase (BOBP/REP/85), though not intended to explore the member-countries' views on the future of BOBP, came out with a clear message that the Programme should continue to tackle the challenges of fisheries in the region. Subsequently, in Phuket, Thailand, representatives of the national governments at the 24th Advisory Committee Meeting in October 1999 voiced clearly and categorically, through the Phuket Declaration,their desire to see BOBP emerge as an IGO.

Why an IGO?

The role of coastal fisheries in food security, employment and income in the BOB countries is critical. The BOB large marine ecosystem supports some 6-8 million fish harvesters directly, of whom about 90 percent are small-scale fishermen. Besides, about 35-40 million others are engaged in ancillary activities relating to fisheries. The region covers some of the most productive waters in the world and a fisheries which is characterized by complexities of multi-gear and multi-species resources.

However, in the new millenium, small-scale fisheries in the BOB region is confronted with tough problems and challenges. Declining catches, continuous degradation of the environment, post-harvest losses, conflicts between large-scale and small-scale harvesters, and a host of other issues fast threaten the livelihood of millions of small-scale fishers.

Governments in the region have long recognised the need for fisheries management to improve the situation, but have lacked resources and technical expertise, even the will. The changes necessary to develop small-scale fisheries in general, and in the BOB region in particular, are influenced by the complex interaction of social, political, economic and technological forces. Further, there is often strong resistance to change – because small-scale fisher communities are deeply rooted in tradition. To effect substantive transformation through changes in attitudes, knowledge, and skills and through the adoption of more efficient and effective methods of resource utilization, substantial effort would be required at all levels.

(Continued on Page 5)

BOBP's New Coordinator

Dr Yugraj Singh Yadava, 47, who joined BOBP as Interim IGO Coordinator in August 2000, brings to the organization 24 years of varied experience in India and elsewhere.

A master's in zoology from Kanpur University and a PhD from Gauhati University on "Fisheries management in floodplain lakes", Dr Yadava started his scientific career with the Indian Council of Agricultural Research as a Scientist. He conducted pioneering investigations on the floodplains of the Ganges and the Brahmaputra, and helped develop technologies for small-scale carp and cat fish farming in the north-eastern States of India. He worked on optimization of fish yield in small reservoirs and impoundments, and carried out ecological investigations in the Sunderbans delta in the State of West Bengal. Dr Yadava also had a brief stint with the Institute of Freshwater Ecology (Edinburgh laboratory) where he undertook studies on eutrophication processes in some selected sites of special scientific importance.

During his seven-year tenure with development organisations in the Government of India, Dr Yadava served as Advisor Fisheries to the North-Eastern Council based at Shillong, Meghalaya; in June 1994 he took up the important post of Fisheries Development Commissioner in the Ministry of Agriculture, New Delhi, and had the unique opportunity of overseeing the development of both marine and inland fisheries (including aquaculture).

Under his leadership, fisheries in India witnessed dynamic changes and the introduction of policies and programmes which in the long run will foster the development of sustainable and responsible fisheries. Optimisation of the marine fishing fleet, implementation of a uniform ban on fishing during the monsoon, cleaner fishing harbours, revalidation of the fisheries potential of the Indian seas, small-scale rural aquaculture, introduction of exotics and movement of live aquatic animals, use of turtle excluder devices in fishing trawlers, and sea safety programmes for fishermen are some of the areas where considerable work was done during his tenure.

Dr. Yadava's contributions to development of environment-friendly shrimp aquaculture have been substantial. As the first Member Secretary of the Aquaculture Authority, set up as per the directions of the Supreme Court of India in 1997, he was instrumental in formulating rules of procedure, guidelines, etc.

Dr Yadava is a well-known face in international fisheries, having contributed to several expert consultations, ad-hoc working groups, inter-governmental meetings, regional conferences, etc.

Dr Yadava's association with the BOBP dates back to the early 1990s. As a scientist with the Central Inland Fisheries Research Institute, Barrackpore, he was associated with the Programme's environmental studies (published as BOBP/REP/67, "An environmental assessment of the Bay of Bengal Region"). Subsequently, as Fisheries Development Commissioner, he played a pivotal role in implementing the Programme's Third Phase activities in India. He chaired the annual review meetings of BOBP activities in India and also some of the Advisory Committee Meetings, where his insights helped provide direction and guidance on the Programme's work. Along with Dr. Gary Preston, Dr. Yadava documented the Learnings of the Third Phase (published as BOBP/REP/85), which spelt out in clear terms the need for an inter-governmental set-up in the region.

Dr Yadava takes over the helm of affairs at BOBP at a very crucial juncture, when he has to steer the process of institutionalisation of the Programme as an Inter-Governmental Body within a small time frame set by the FAO.

Administrators and decision-makers in fisheries in the region wish Dr Yadava all the best in his new role as the Interim IGO Coordinator.

S R Madhu

The CHONG Years

The BOBP's Third Phase began late in 1994. The first two phases saw the generation and extension of new technologies to better the living conditions of fisherfolk through higher incomes. The Programme was active on many fronts: developing more effective fishing boats and gear, extension techniques, aquaculture and post-harvest technologies, and resource knowledge. A steady stream of reports, pictorial newsletters, video films and audio-visuals flowed throughout the first two phases, much to the acclaim and delight of fisheries staff and scientists of the region.

The Third Phase saw a new dimension to BOBP's role in the region. Thematically the Programme switched its focus to management – which was at once less easy to visualize, more difficult to design, more time-consuming to implement, than production. This Phase also saw a greater emphasis on national execution as opposed to the earlier direct field work by the BOBP staff.

Kee-Chai Chong was the right choice as Director for this new phase. He tirelessly preached the values of frugality, consultation and consensus. His pet themes were that man must respect nature instead of ravaging it, eschew past extravagance, draw on traditional wisdom and knowledge, and attempt to do more with less.

The Third Phase, in tune with the contemporary global initiatives, promoted consciousness about fisheries management throughout the region. The stakeholder approach to planning and management – under which all possible stakeholder types are identified, problems jointly discussed, possible solutions listed, and mechanisms for solutions through co-operative effort laid down – was introduced in every country through pilot activities, and written about extensively in *Bay of Bengal News.*

The pilot management activities which BOBP helped implement in the seven countries were remarkable for their variety. The conflict-prone fisheries of Kanniyakumari is far different as a management issue from the resource problems posed by push nets and set bag nets in Bangladesh. The ornamental fisheries of Sri Lanka are a unique problem. So are the reef resources of Maldives. Phang-Nga bay in Thailand, where community-based fisheries management was attempted through a whole package of management measures, was perhaps the most successful and the most instructive of all the projects. Pulau Payar marine park, Malaysia, was again one of a kind, an example of how resources could be conserved and expanded by designating and setting apart marine protected areas. Lessons from this project are applicable wherever governments wish to tap the wealth of marine parks. The management approaches for small-scale fisheries developed in Indonesia were taken up by a larger regional project.

That a small programme based in Chennai with limited resources could help develop management initiatives and solutions in as many as seven countries was quite remarkable. One reason is that Dr Kee-Chai Chong succeeded wherever possible in leveraging BOBP and FAO assistance to maximise development impact in an area.

To get its message across, the Programme in the Third Phase leaned heavily on workshops and publications. Being a prolific writer, Chong wrote a number of articles on various aspects of fisheries management. These were useful in view of BOBP's mandate to set a new paradigm for fisheries management in the region.

Chong believed passionately that BOBP should continue in some form after the expiry of Programme funds. He ceaselessly advocated the setting up of an inter-government body to take over from BOBP. He felt that an organization that had accomplished so much should not be allowed to wind up without a trace. If today the outlook for such a body is better than before, Chong (now a roving consultant on the eastern side of the Bay) is perhaps more responsible than anyone else.

BOBP wishes Dr Chong and his family all the best in the years to come.

S R Madhu

Exploratory Fishing Trials: training workshop on design, implementation and management

A 5-day training workshop on the design, implementation and management of exploratory fishing trials was held from March 20, 2000, at the Central Institute of Fisheries Navigation and Engineering Technology (CIFNET) in Chennai.

Organised by BOBP, the workshop was meant for Fisheries Department officers from India's four east coast states of Tamil Nadu, Andhra Pradesh, Orissa and West Bengal.

Seven officials from Tamil Nadu and one from Andhra Pradesh took part in the course. Two resource persons from the CIFNET (Mr. R. Mohanam and Mr. M.P. Mohanan), one from the Central Marine Fisheries Research Institute (CMFRI) – Dr. E. Vivekanandan; and three from the Fisheries Survey of India (FSI) – Mr. Mangala Das, Mr. Anrose and Mr. J.E. Prabhakar Raj – served as resource persons. On behalf of BOBP, Mr. A.D. Isaac Rajendran (training coordinator) and Mr. P.V. Ramamoorthy provided inputs as resource persons.

Dr Kee-Chai Chong, Director of BOBP, inaugurated the workshop. Mr. R. Mohanam, Deputy Director of CIFNET's Chennai unit, chaired the inaugural session.

Workshop topics:

- Information on fish resources in offshore waters based on desk research
- Coastal fisheries resources of the four east coast states
- Status of resources in inshore waters, and need for scientific management
- Options for fishery resource management and diversification from inshore to offshore fishing
- Methodologies for participatory offshore pelagic fishing trials for fishermen using shrimp trawls. Introduction to multi-day fishing with multi-gear operations in untapped fishing grounds
- Planning, design and implementation of participatory exploratory fishing trials for adoption in each state.
- Day and night signals for fishing vessels, and navigational equipment for offshore fishing
- Deckfitting requirements for offshore surface gillnet and line fishing
- Methodology to determine deck fittings and line haulers for fishing vessels
- Commercial exploratory fishing on pilot scale
- Preparing for fishing voyages
- Scouting and reconnaissance operations for fishing voyages
- Maintenance of fishing vessels on board and on the shore
- Compilation and recording of data in logbooks for fishing operations.
- Code of conduct for responsible fisheries
- Methodology for data analysis
- Economics of exploratory fishing trials; adopting the results of fishing trials for commercial use.

A fishing day trip was held with a private 43 ft. trawler converted as gillnet vessel on 23 November, to give the participants practical experience and acquaint them with operational details concerning the organization of voyages and gillnetting.

Workshop participants got background papers and work sheets in advance as reading materials to help prepare for the workshop. The audio-visual aids at CIFNET were put to good use by the resource persons.

Background to the workshop

The workshop was an outcome of recommendations made at a high-level meeting to review BOBP-assisted activities in India, held on June 29, 1999. Top fisheries officials at the centre and the four east coast states took part in the meeting, at which BOBP briefed participants about coastal fisheries management activities in Kanniyakumari district, Tamil Nadu. They were told that inshore waters in the area had got crowded with fishing vessels of different types. As a result, catch per unit of the vessels had stagnated, even fallen, and conflicts had broken out between fishermen.

In an effort to tackle the problem, BOBP in consultation with the stakeholders and the Department of Fisheries, Tamil Nadu, prepared a project proposal for exploratory offshore fishing trials. "The idea is to facilitate and encourage diversification of the trawl fishery in the state," said Mr. Isaac Rajendran. "With some low-cost modifications, the 43 ft trawlers or trawl boats can operate pelagic gillnets and longlines in offshore waters. They can also put cruising time to and from fishing grounds to good use by operating trolling lines."

In its project proposal, the DOF, Tamil Nadu, said that the exploratory fishing operations would be participatory – in co-operation with fishermen operating trawl boats. The operational base would be the Chennai and Chinnamuttom (capital of Kanniyakumari) fishing harbours.

Consequently, a five-year proposal was forwarded to the Government of India for financial support. However, the Ministry of Agriculture pointed out that a national policy for marine fisheries was being developed to direct and facilitate the management of coastal and marine fisheries in India. The five-year project proposal could be taken up once this national policy was finalized. Meanwhile, BOBP could go ahead with the training of east coast fisheries officials (training of trainers) in the design, conduct and management of exploratory fishing trials. Once the national policy got under way and funds became available, a programme for diversification of inshore trawl fisheries could be implemented.

BOBP then held discussions with CMFRI, CIFNET and FSI about a training workshop on exploratory fishing trials. The three organizations offered to make facilities and resource persons available.

"Participants at the workshop took active part in the discussions," said Mr P.V. Ramamoorthy. "They also discussed ways and means of interacting usefully with fishermen during offshore fishing operations. The one-day fishing trip was useful too … The workshop was a good preliminary step. Participants will be able to provide inputs and support when a programme to diversify fishing from inshore to offshore waters is eventually implemented."

BOBP as an IGO

(Continued from Page 1)

With the emergence of a new global order in the management of fisheries, the responsibilities on the national governments have increased manifold. Therefore, attainment of national economic and social goals for the well-being of fisher families and for the sustainable development of fishery resources would call for much greater effort on their part.

Can the national efforts be supplemented and complemented by regional initiatives?

The BOBP has an excellent track record as catalyst and consultant in developing, demonstrating and promoting new techniques and technologies to help improve the conditions of small-scale fisher communities in the region. The Programme's past activities – many of them of a pioneering nature – have laid a strong foundation for small-scale fisheries development and management. An IGO would carry the work forward.

The IGO would stimulate and strengthen national management efforts, the prime need in fisheries today. More. Experiences in every member country of BOBP through the Programme's pilot activities provide lessons and learnings useful for all, obviating the need for expensive duplication of effort. During the Third Phase, Malaysia's experiences with national parks, India's efforts with conflict resolution in Kanniyakumari, Thailand's work with community-based fisheries management, and Sri Lanka's pilot project on ornamental fisheries were instructive examples of complex and significant management initiatives. BOBP has been instrumental in sensitizing national governments to the needs of good management. This work requires continuity. The benefits of management are now well recognized, but the methods and approaches are still not well understood or implemented. The Code of Conduct for Responsible Fisheries needs to be taken to user groups. People's participation and women's empowerment must be institutionalised, and be an integral part of the development and management process – at the policy-making level, also at the grassroots level, in the many thousand fishing villages of the region. Management regulations must be harmonised and streamlined.

There are many other areas where regional or sub-regional initiatives would be of immense value. Enforcement of regulations concerning capture fisheries. A common vessel monitoring system. Stock surveys. Methods to estimate harvestable potential. Networking of fishermen cooperatives and associations. Networking of information. Quality assurance in fish and fishery products. Specialised services for technical backstopping. Communication strategies for fisheries management.

Establishing a new order in fisheries management in the BOB large marine ecosystem can be possible only through co-operative effort, joint initiatives and a better understanding by member-countries of the region of one another's problems. Shared waters need shared management. There cannot be a better mechanism than the BOBP for establishing a new paradigm in natural resources management or for addressing the common requirements and needs of small-scale marine fisheries of the region.

As a powerful catalyst of small-scale fisheries development and management in the region for over 20 years, BOBP has effectively demonstrated what regional co-operation can achieve. It is incomparable within the region as a generator of ideas, as an engine of change or as a promoter of exchange of experiences in small-scale fisheries. As an IGO, it will continue to meet the aspirations of member-countries for promoting sustainable and responsible fisheries.

BOBP as an IGO will be the best gift of the new millennium to fisheries in the region. *Let us join hands in making this gift possible.*

Y.S. Yadava

Documentation of Learnings, Bangladesh*

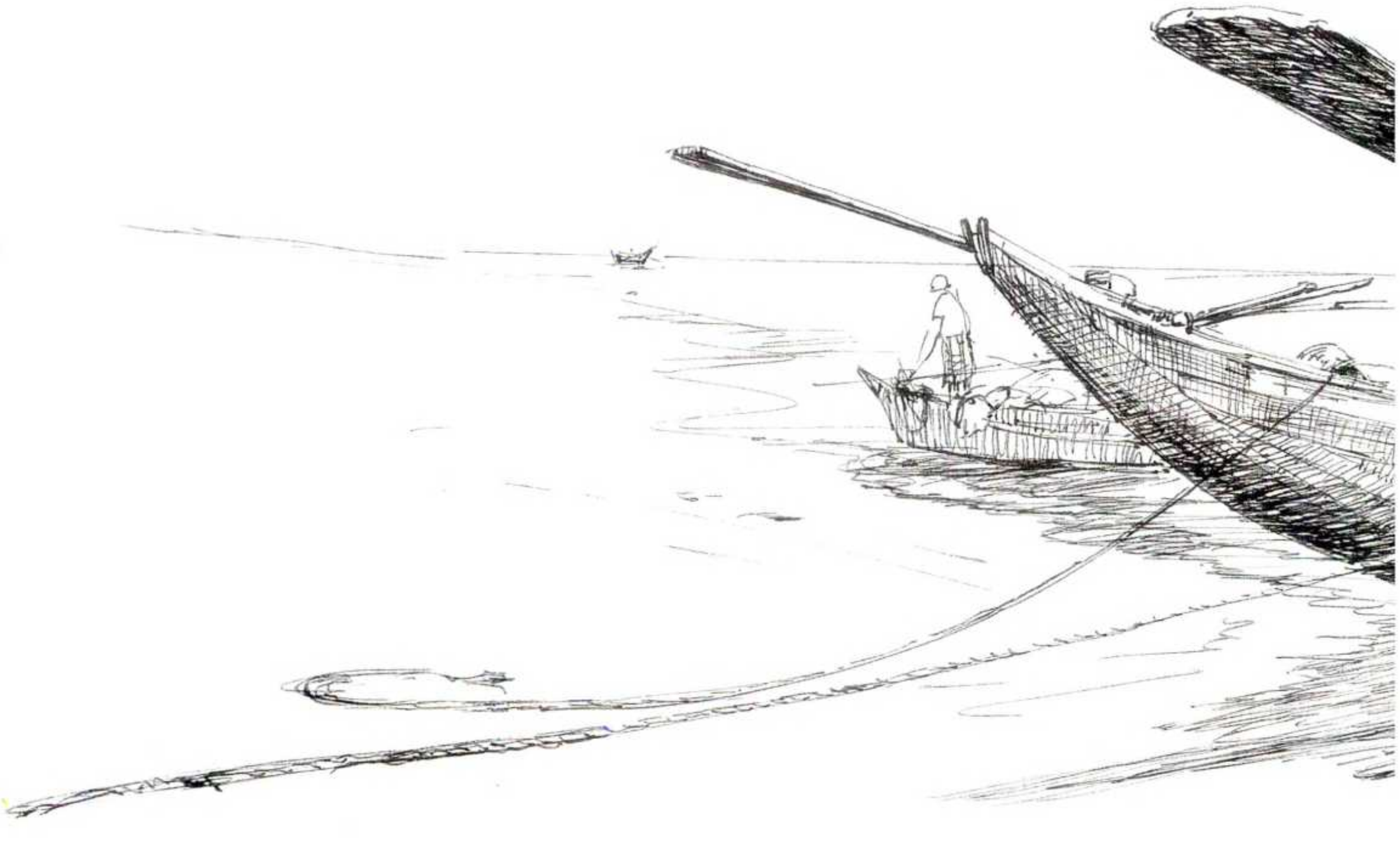
The estuarine set bagnet and push net fisheries in Bangladesh are traditional fisheries that employ large rural populations; but both are resource-damaging. BOBP work in Bangladesh on managing the two fisheries has yielded some useful lessons concerning management options and implications.

An estimated 20% of Bangladesh's population of over 123 million people live in coastal areas. A majority of them are fisherfolk or people dependent on marine resources for their livelihood. A situation analysis undertaken by the Bangladesh Department of Fisheries (DOF) of the Ministry of Fisheries and Livestock (MOFL) in 1994 identified the estuarine set bagnet (ESBN) and push-net fisheries as problem fisheries whose management needed immediate improvement. The analysis was based on a bio-socio-economic study of the fishery for tiger shrimp *(Penaeus monodon)*, undertaken during the second phase of BOBP.

The ESBN fishery is a traditional fishery. It is not only a source of livelihood for a large population of mostly poor rural inhabitants, but is also responsible for much of the country's marine and brackish-water capture fisheries production. The fishery provides most of the animal protein consumed by the rural poor in coastal areas. The ESBN fishery interacts with at least seven other fisheries and has been shown to be destructive. It could lead to growth and recruitment overfishing of several important marine and brackishwater species.

It is widely agreed that the only realistic option to improve the management of this fishery is to reduce the fishing effort – through closed seasons or closed areas, for instance. However, this depends not only on ESBN fishers and other stakeholders being aware of the need for, the benefits of and methods of management, but more importantly, on their having alternative sources of income generation to ensure livelihood and food security.

Another approach may be to attempt gear modification to make it less destructive, but it is not yet clear how this could be done.



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* A summary of comments made by a two-member Mission (G.L. Preston, Y.S. Yadava) that visited Bangladesh in 1999 to review BOBP's work during its Third Phase (BOBP 3).

The large number of fishing gear currently in use means that any organism discarded alive would quickly be captured again by another unit of gear. There may be potential to use aggregators to collect shrimp seed for capture, but this is an alternative, not a technological improvement.

The push-net fishery is of more recent origin, having evolved to supply Bangladesh's rapidly growing coastal aquaculture industry with *P. monodon* and *Macrobrachium rosenbergii* post-larvae. The fishery is very destructive because over 90% of its catch consists of juveniles of other commercially important species of marine and brackishwater organisms, which are discarded. The fishery not only provides the vast majority (over 95%) of the seed requirement of the coastal aquaculture industry (which is Bangladesh's second largest foreign exchange earner), but also provides seasonal livelihood for several thousand poor people, including a high proportion of women and children.

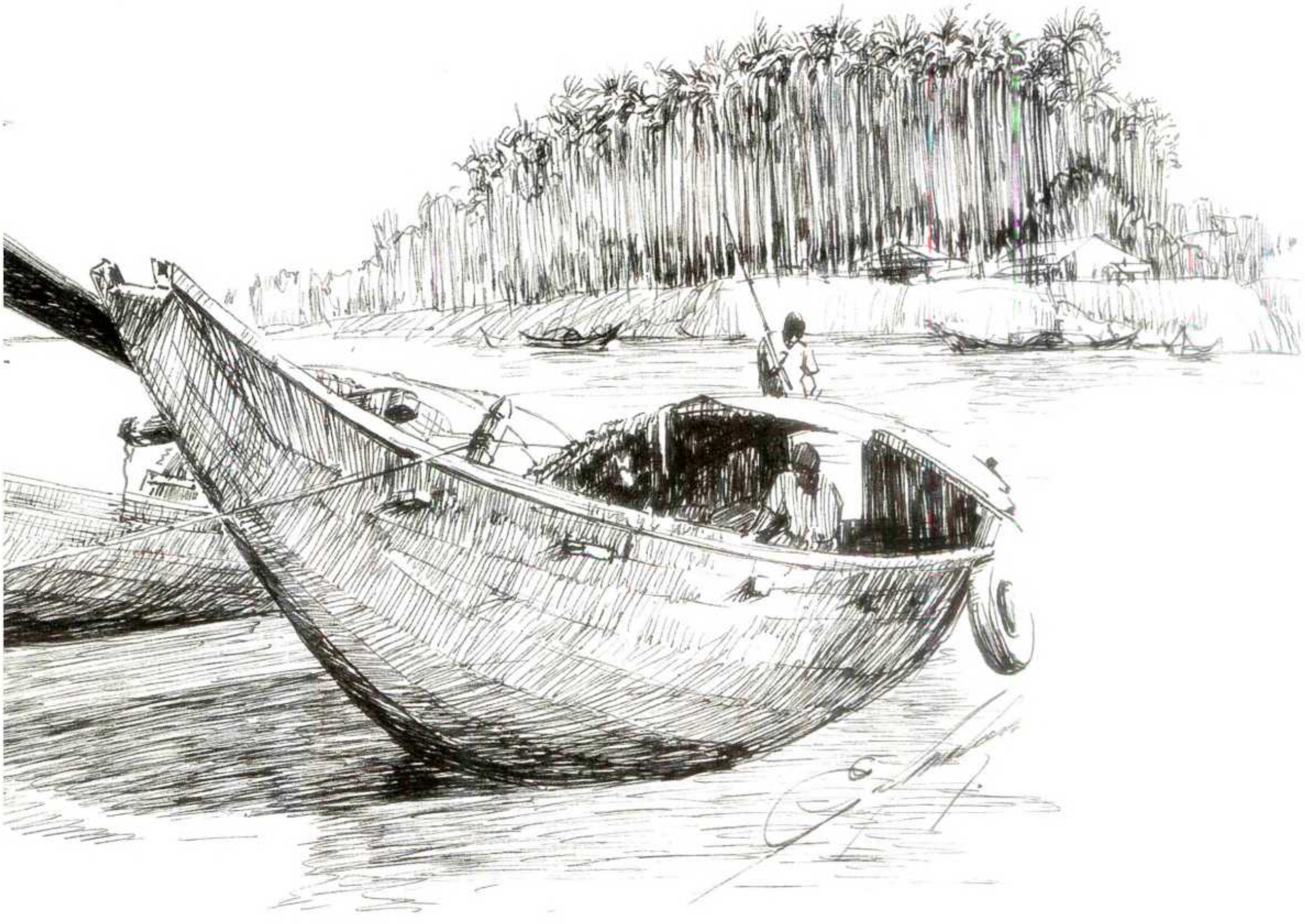
The best management option for the push-net fishery would be to ban it completely. However, this is impossible, given the coastal aquaculture sector's dependence on it, not to mention the number of poor men, women and children who make a living from it. The Government of Bangladesh is nevertheless under pressure from trawler owners to ban both the ESBN and push-net fisheries, which they claim are reducing their yields.

The purpose of BOBP's intervention in Bangladesh was to facilitate and enable improved management of the ESBN and push-net fisheries in selected coastal areas. This was to be achieved through awareness-building, strengthening the institutional capacity of concerned agencies, and provision of technical assistance.

As regards the ESBN fishery, it was decided that the BOBP project should focus on awareness-building of stakeholders at all levels, and in building the capacity of the DOF and the Fisheries Research Institute (FRI) in participatory techniques. It was also agreed that several pilot activities on seasonal and area closures of ESBN fishing would be attempted to test the feasibility of the idea and to gauge the social and economic implications of such initiatives.

As regards the push-net fishery, BOBP hoped to influence policy through awareness building and consultation amongst stakeholders in order to move towards more sustainable aquaculture practices based on hatchery-produced seeds. Hatchery development is seen as a long-term mitigating measure, but the small number of hatcheries in the country (14-24 according to different commentators) is constrained from growing by lack of investment capital. BOBP also aimed to work with the seed collectors and other stakeholders to reduce by-catch mortality, as well as the mortality of shrimp seed themselves during handling and transport.

BOBP's initial activities in Bangladesh took place in 1995. DOF and FRI staff were trained in participatory techniques, and in the planning of field work to undertake a series of stakeholder studies in three areas selected for this purpose. Subsequently, in 1996, several workshops and stakeholder consultations were held at which the strategies for the two fisheries were articulated and refined into a more detailed work plan. This involved identifying alternative income-earning opportunities for ESBN



fishermen, and research on aspects of by-catch and seed transportation mortality in the push-net fishery. The stakeholder consultations led to links with SAVE, a development NGO that specialises in the production of media and awareness materials. SAVE was commissioned to produce poster exhibitions, audio tapes and radio programmes to be broadcast on Radio Bangladesh, and comic books in support of the project's awareness-raising activities. Most of these tasks have been completed, although there were some delays in actually having the radio programmes broadcast once they were made.

The research work and stakeholder consultations led to the selection of the Cox's Bazaar area for a trial closure of the ESBN fishery. Seasonal closures during February-March and September-October were proposed as these were times of high shrimp seed catch. To prepare for the closures, a study of alternative income-generating (AIG) opportunities was carried out in six villages of the area by the Community Development Centre, an NGO based in Chittagong. Various options were identified, including betel-nut growing, small trading, crop cultivation, salting of hilsa (river shad), mechanical repair, etc. In reality, however, the solution of using AIG as a fishery management tool is fraught with problems, including the establishment of suitable banking and credit arrangements, dealing with seasonality of occupation, and preventing new economic migrants from entering the fishery if current fishermen move to alternative occupations.

At present it seems that there is little to prevent new fishermen coming into the fishery to replace those who move out. Many of the present push-net fishermen are new entrants who were previously working in unskilled or low-paid jobs such as rickshaw-pullers, and others may be waiting in the wings to replace those who leave the fishery. Part of the plan to support AIG activities involves the setting up of a financial or banking scheme which will be administered by DOF and implemented by selected NGOs, who will be able to make credit available to fishermen for AIG activities. However, the size and complexity of this task appears to have been underestimated by the DOF. Promoting AIG schemes is a complex and expensive task that requires skill training, credit support, managerial assistance and marketing help, and without the support of other government agencies and donors it will be difficult for DOF to do justice to this task, with or without BOBP assistance.

The state of play at the time of the study was that a series of public consultations would take place in order to promote broader public understanding of, and hopefully support for, the proposed closure. It was intended that this would be accompanied by training in reduction of shrimp mortality (e.g. through the use of air pumps). Subsequently, DOF will be able to move ahead with implementation of the seasonal fishery closures, in parallel with the AIG activities described above. The seasonal closures were originally scheduled for June 1999, but at the time of the present study (July 1999), the process had not really commenced.

In general, therefore, BOBP's primary activities in Bangladesh have proceeded in the direction planned, but there have been delays in some components. The level of performance of junior and middle-level DOF officers is said by BOBP staff to have been high, and in some cases outstanding, with many officers being enthusiastic about the project and the concepts it introduced. However, the organisational culture and management environment of the DOF are often not conducive to supporting innovative and creative efforts such as fisheries management. Funding shortages appear to be an important constraint; it not only makes national execution difficult, but raises the question of post-project sustainability.

The Marine Wing of the DOF, which is responsible for implementation, does not have a staff presence at the district and thana levels, and this may result in implementation problems. Testing of management initiatives will require issue of regulations, ordinances and notifications which can be delayed due to lengthy bureaucratic processes, and this can delay the project. Management initiatives, all of which depend on reduction of fishing effort, will succeed only if AIG options exist and are accessible, but initial indications are not very promising. Essentially, the fishery management problems being faced are huge and intractable.

Other activities have also been carried out, such as provision of training on participatory exploratory fishing trials, which took place in 1996 through a consultancy input but seems to have led to little in the way of follow-up by DOF. In 1998 BOBP organised a workshop on the Code of Conduct for Responsible Fisheries in Bangladesh as well as a workshop on monitoring and evaluation of fisheries development and management. BOBP has also worked with DOF, FAO and the British Department for International Development (DFID) to organise a National Workshop on Fishery Resources Development and Management. This was held in 1995 and brought together policy-makers, planners, administrators, fishery professionals, industry representatives and fisherfolk to discuss the status of Bangladesh's fishery resources and give directions for the future. In 1997, the same group of agencies organised a senior decision-makers' consultation which brought together Members of Parliament from the coastal constituencies, as well as ministers and technical advisors from government departments concerned with coastal development, to discuss coastal management and food security issues. The meeting provided an opportunity for senior administrators, policy-makers and politicians to be exposed to the needs and problems of coastal communities, and was viewed as a very valuable and important exercise.

It was noticeable from the study team's discussions in Bangladesh that BOBP was considered a small and somewhat insignificant project compared to the numerous and much larger national projects that are being developed, and which include elements of community-based management of coastal resources. The consultants were advised about several such projects, varying in magnitude between US$ 7 million and $ 26 million, that were currently in the planning phase, with support from a range of donors including the UNDP, GEF, and the British and Dutch Governments. Compared to these projects, the inputs from BOBP are indeed relatively tiny. However it was gratifying to observe that the approach and methodology pioneered by BOBP were being adopted by other donors in formulating these projects. In one case, BOBP had been formally invited to provide direct assistance to the project design process in order to ensure that the participatory approach was fully embedded in the project.

Other issues raised in Bangladesh related to some of the procedures used by BOBP. There was a broad feeling that national officers working with the project had too little say in the decision-making process (especially financial), and that the Programme itself was 'too remote', with actual in-country interventions being relatively limited. This was considered by the study team to be a reflection of the limited resources available to BOBP3 itself, and perhaps also to the above-mentioned factor, that in Bangladesh BOBP3 is a very small project compared to many others being established in the country.

From another standpoint, it is clear that the Bangladesh Government's procedures for approval of activities and financial disbursement are not at all geared to the type of work promoted by BOBP. The Government system requires a rigid work programme and a budget approved far in advance, and makes little or no provision for modifications or amendments as the activity progresses. This approach is unsuitable to a BOBP3-type project, where the learning process is continuous, and activities need to be developed or modified in response to study findings or outcomes of the participatory process.

In spite of all these constraints and problems, a lot has been achieved in Bangladesh. Significant capacity-building within the DOF has been realised, and test management initiatives are ready for implementation. The participatory principles on which BOBP3 has operated have been adopted by at least two other, much larger aid-funded projects aimed at managing fisheries through the empowerment of coastal communities. In one case this is a direct result of BOBP involvement in project formulation. At the senior decision makers' consultation organised by BOBP, MOFL announced the development of a comprehensive fisheries policy and proposed the establishment of a high-level, inter-ministerial task force, with the Prime Minister as Chairperson, to give direction to, coordinate and oversee coastal development, including development and management of marine and coastal fisheries. With MOFL taking increasing responsibility and gearing itself up for testing management initiatives, it is intended that BOBP's role during the remainder of the project period will be reduced to conducting reviews and providing technical assistance as required.

"Public hearings" on managing the ESBN & PN Fisheries in Bangladesh

As part of the fisheries management effort initiated by BOBP, nine "public hearings", a consultation and a road show were held on the country's push net fisheries from November 1999 to June 2000.

A push net team picked 50 push net collectors from three fishing villages (Samity Para, Saikat Para, Kalatala or Laboni Para) for the public hearings).

During the first hearing, the push net collectors agreed that their nets are destructive and harmful to marine fisheries resources. They said they had started releasing by-catch back into the sea, but faced some problems.

- They had no pots or containers to hold the by-catch and put it back into the sea
- Not all the PL-collectors were motivated.
- There was no legislation to protect the resource.

The collectors requested a supply of containers, and suggested that vigilance groups supervised by the Department of Fisheries should monitor the activities of the collectors. Legislation should ensure that PL was released back into the sea.

During the first public hearing, participants were asked to practise PL collection carefully, without harming the marine resource. Techniques to reduce PL and by-catch mortality were demonstrated. The PL collectors were enthusiastic and agreed to act in the nation's interest by accepting the advice of the Department. The first hearing was thus useful in building awareness among PL collectors and providing them with an impetus to move ahead.

In response to requests made at the first public hearing, a hundred aluminium vessels and 15 air pumps were later brought and distributed among 100 fisherfolk.

A second set of public hearings was held after four months. Participants were divided into four groups of 50 persons each. One person in each group was given the responsibility of monitoring the activities of all the group members. At this hearing, techniques to cut down PL and by-catch mortality and the practice of releasing by-catch at hip-depth water were demonstrated. Every group member expressed his view on how the PL collectors could be persuaded to reduce the mortality of shrimp larvae and by-catch.

The participants' response was encouraging. They told the team about some techniques they had developed through experience. They said they were themselves alarmed at the depletion of fisheries resources, and agreed they had a responsibility to the country to save these resources from destruction. The low-priced fish that was once a part of their diet were no longer available cheap. They even suggested that people who do not release fry back into the sea should be punished.

It was decided that every participant should motivate 10 push net collectors. One of them announced, to enthusiastic applause, that he had motivated as many as 40 collectors.

A final phase pf public hearings, held during May-June 2000, focused on alternative income-generating activities such as poultry-rearing, running a small shop, goat-keeping, fish culture, fish trade etc. But as the fisherfolk lived on the seashore, there wasn't much scope for alternative income-generating activities.

The Department of Fisheries believes that shrimp post-larvae collection is still more profitable than any other occupation. It is highly unlikely that the push net collectors will relinquish it and take up anything else for a living, despite what they say. But they need some help to organise themselves to solve the problems of overfishing and declining resources.

Some PL collectors said they were forced by middleman (to whom they owe money) to operate the push nets even during the slack season. If they get loans, they will repay the middlemen and practise restraint in capturing shrimp post-larvae.

ESBN fisheries

Pilot awareness-building activities started in October 1999 instead of May because of both bureaucratic and weather delays. Three model villages of ESBN fisherfolk were selected in Cox's Bazar district. They were Gorkghata Jaladas Para and Mudirchara-Ahamadiakatta from Moheshkhali Upazila, and Teknaf Jalia Para from Teknaf Upazila. A public hearing was conducted in the three villages from April 5 to 10, 2000. Day-long activities in the villages included lectures, discussions, distribution of comic books, audio-visual programmes and mobile exhibitions. Participants outlined the past and present state of marine coastal fisheries resources, the life cycles of important shrimps and fishes, their exploitation by different types of gear, and the management of gear by the government.

Documentation of Learnings, Sri Lanka*

In Sri Lanka, BOBP supported a wide range of knowledge-building and awareness-raising activities about management of the ornamental fishery, and promoted consultations among various stakeholder groups on management plans for the fishery.

BOBP3's work in Sri Lanka has focussed on establishing management arrangements for the expanding ornamental aquarium fishery in the country, with a particular focus on the southwest coast from Puttalam to Hambantota. The project's objective is to facilitate and enable improved management of the ornamental fish sector through awareness building, strengthening the institutional capacity of the agencies concerned and technical assistance. Although focussed on aquarium fish, BOBP's work is intended to take place in the broader context of conservation of critical aquatic habitats such as coral reefs, lagoons, mangroves, sea grass beds, estuarine and riverine systems, and to promote sustainable resources utilisation from such habitats.

Aquarium fish collection is not a new activity in Sri Lanka, which was a pioneer in the industry. Between 1930 and 1960 the country had a thriving trade in the export of ornamental freshwater fish, which were sent mainly to Europe by ocean steamer. However, the industry declined due to a combination of factors, including competition from other countries, a failure to keep up with technology, and an unfavourable business environment created by a protectionist government economic policy.

In more recent times the industry has revived again, thanks to the opening up of the economic system and the growth of the tourist and air travel industry, which has provided direct air cargo connections to numerous destinations in Europe, the Middle East, Asia and Japan. The current phase of ornamental fish industry development began around 1991, when live fish exports were valued at about 5% of the total fish export value. In the subsequent seven years there was a 13-fold increase in the value of exports (compared to an eight-fold increase in the value of total fish exports) which resulted in aquarium fish accounting for about 8% of the total. About 60% of the ornamental fish exported are marines with the rest being brackishwater or freshwater species. Although there are numerous companies registered as live fish exporters, only about 20 are actually exporting at present.

Despite its rapidly growing economic importance, not much information exists about the ornamental fish sector in Sri Lanka and there are no data to suggest that any of the stocks are under stress or in danger. However, Sri Lanka's BOBP3 situation analysis, conducted by the Department of Fisheries and Aquatic Resources (DFAR) in 1994, identified the ornamental fish sector as a problem fishery whose management was considered a high priority need for the following reasons:

- Ornamental fish are collected from some of Sri Lanka's most vulnerable environments, including coral reefs, mangroves, lagoons, estuaries and sea grass beds. There was therefore concern about the future sustainability of the country's rich aquatic resources. Several NGOs had expressed concern that activities such as collection of ornamental fish were destroying Sri Lanka's biodiversity and putting the environment and the people at risk;
- Several government agencies have mandates that oversee wildlife, environment and natural resources utilisation. Legislation, rules and regulations in regard to some of them were in conflict with one another. The government felt the need to rationalise the process to promote a more coordinated multi-disciplinary approach;
- DFAR was of the opinion that the lessons learnt from improving the management of the ornamental fish sector would guide and give direction to processes to improve the management of larger and perhaps less organised fisheries that target food fish.

To this list should perhaps be added a national-level fisheries management programme that was already operating in Sri Lanka at the time BOBP3's work programme was being planned. This five-year initiative, funded by the UNDP and executed by FAO, aimed at improving the management of all types of marine food fisheries throughout the country. In addition to the reasons cited above, it seems only natural that DFAR should have selected an area for BOBP3 attention that was not already being addressed by another Programme.

Little is known about the populations or the biology of many of the ornamental fish species being collected. Some are rare or endemic to Sri Lanka, and there is a concern that the rapid growth of the industry or indiscriminate collection could lead to overfishing. Management of the fishery thus relies on improving knowledge of the biology and ecology of the species concerned.

There is also the question of how the fish are collected. So far, toxic poisons or narcotics do not seem to be used as collecting tools, as they are in many other countries, and Sri Lankan aquarium fish have an enviable reputation of being 'drug-free'. The government has also placed a ban on some fishing gears which are not eco-friendly, such as 'moxy' nets (a type of surrounding net which touches onto the coral and which may be used in conjunction with coral smashing). Management arrangements for the fishery will need to ensure that there is no movement towards the use of harmful or destructive collection methods.

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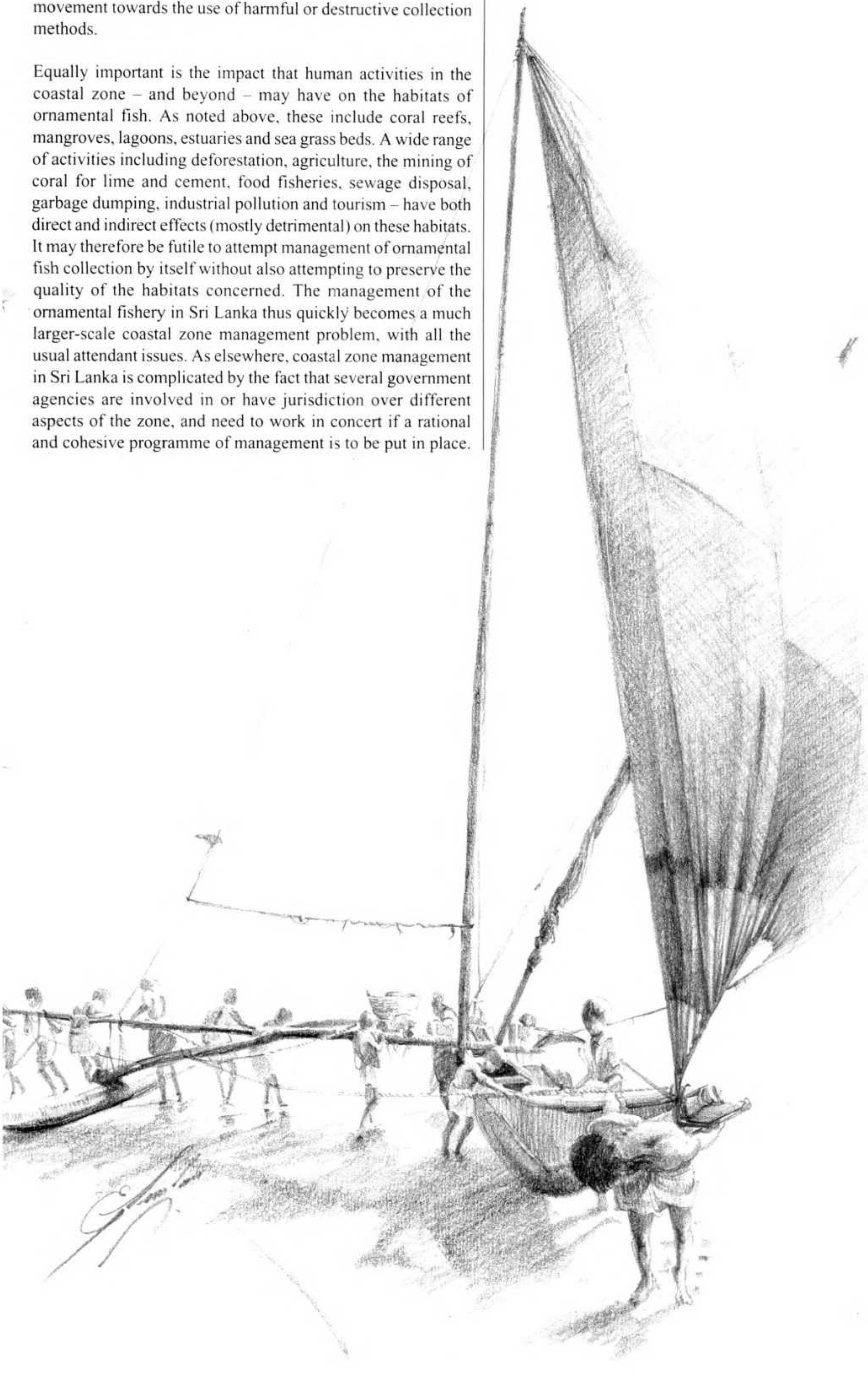
* A summary of comments made by a two-member Mission (G L Preston, Y S Yadava) that visited Sri Lanka in 1999 to review BOBP's work during its Third Phase (BOBP 3).

Equally important is the impact that human activities in the coastal zone – and beyond – may have on the habitats of ornamental fish. As noted above, these include coral reefs, mangroves, lagoons, estuaries and sea grass beds. A wide range of activities including deforestation, agriculture, the mining of coral for lime and cement, food fisheries, sewage disposal, garbage dumping, industrial pollution and tourism – have both direct and indirect effects (mostly detrimental) on these habitats. It may therefore be futile to attempt management of ornamental fish collection by itself without also attempting to preserve the quality of the habitats concerned. The management of the ornamental fishery in Sri Lanka thus quickly becomes a much larger-scale coastal zone management problem, with all the usual attendant issues. As elsewhere, coastal zone management in Sri Lanka is complicated by the fact that several government agencies are involved in or have jurisdiction over different aspects of the zone, and need to work in concert if a rational and cohesive programme of management is to be put in place.



Against this background, BOBP 3 began a process of stakeholder identification, problem identification, and awareness-raising. Ministry of Fisheries and Aquatic Resources Development (MFARD) designated DFAR and National Aquatic Resources Agency (NARA) as the primary agencies responsible for implementation of the BOBP-assisted effort, and the activity was incorporated into Sri Lanka's 1995-2000 National Development Plan. The Government committed a budget of Rs. 500,000 into the fisheries plan to facilitate national execution of the project. Four staff of NARA were trained in undertaking stakeholder identification, stakeholder analysis and stakeholder communications and perceptions analysis. A one-day stakeholder consultation was held with selected NGOs interested in and concerned with the ornamental fish sector, which resulted in the concerned NGOs agreeing in principle to participate in the management process. BOBP and Project staff undertook stakeholder analysis by meeting representatives of concerned government agencies, the Live Fish Exporters' Association and the Ornamental Fish Breeders' Association.

The findings of the stakeholder analysis gave direction to the development of a project strategy and detailed work plans for 1996 and beyond. The analysis suggested that while differences existed in the perceptions of problems and solution options by the various stakeholders, there was a clear commonality, in that all parties feel that they stood to benefit in the long term from a programme that would ensure the sustainability of the resources and the habitat.

The central aim of the BOBP-assisted work was thus determined as being to promote consultations and negotiations amongst and between stakeholder groups in order to arrive at a negotiated management plan. To aid and assist the consultation process, two parallel activities were planned. One was to add to knowledge of the status and trends of resources and habitats to provide the stakeholders with the best available scientific information on which to base their decisions. The second was awareness-building on the need for, benefits of and the methods of management amongst all stakeholders. Once the broad approaches had been agreed, BOBP provided support to a wide range of activities, including the following:

- BOBP and DFAR conducted a two-day Orientation Workshop on Fisheries Management for all middle and senior level staff of MFARD and its associated agencies, including District Fisheries Extension Officers;
- BOBP and MFARD conducted a stakeholder consultation to bring together senior administrators and technical staff of 15 government agencies, interested in and concerned with the management of the ornamental fish sector to discuss the issues and concerns and to invite suggestions on how to improve coordination and co-operation in the sector's management;
- 12 staff of DFAR were trained in the conduct of a study on regional values, perceptions and attitudes of fisherfolk and other stakeholders towards fisheries resources, fishing practices and fisheries management;
- DFAR and BOBP conducted one-day meetings with ornamental fish divers and collectors in the Colombo and Negombo areas so as to better understand their problems and elicit their views on solution options. An important issue that came up was mobilization of the divers into an association or a union to represent their interests;
- DFAR and BOBP had discussions with leading insurance companies regarding the possibility of developing custom-designed insurance schemes for accident and life coverage of divers. With the co-operation of MFARD, insurance schemes have been initiated for fisherfolk and divers;
- MFARD organized a meeting of the stakeholders of the ornamental fish sector. The meeting resulted in a recommendation to the Minister for Fisheries and Aquatic Resources Development to request the Cabinet to establish a high-level, inter-ministerial task force on policy and strategy for the conservation and management of critical aquatic resources and habitats, which would coordinate and oversee conservation and management efforts;
- BOBP co-sponsored a trade fair and a seminar to promote the development and management of the ornamental fish sector with MFARD and the Live Fish Exporters Association of Sri Lanka;
- DFAR, NARA and a locally commissioned artist/ diver prepared identification catalogues of ornamental fish species whose export is either banned or restricted. The catalogues, intended for use by the Flora and Fauna Task Force of Sri Lanka Customs, were prepared in the form of loose-leaf binders and were handed over to Sri Lanka Customs by DFAR;
- Water-resistant ornamental fish identification cards, illustrating the species whose export is either prohibited or restricted, were designed and produced for exporters, breeders, collectors, divers and customs staff;
- A study on the Status and Trends of Ornamental Fish Resources and Habitats was commissioned. A senior staff member of the University of Colombo was assigned to conduct the study. MFARD and DFAR organized a workshop to review and discuss the report, which was subsequently modified in the light of feedback received from the workshop;
- A diagnostic study of the monitoring and evaluation system of MFARD by the Ministry of Plan Implementation and independent consultants was set in motion. When completed, the study is expected to give direction to the Ministry's efforts to strengthen its monitoring and evaluation system;
- In direct response to requests from divers, preparatory activities were undertaken to design and develop a comic book on diver safety and conservation.

Some of the BOBP-assisted activities, such as the conduct of stakeholder studies, were impeded by the security situation in Sri Lanka. This has also affected funding of BOBP's counterpart agencies, which has in turn resulted in delays in project implementation. Another concern in regard to national implementation is the acute shortage of trained manpower in fishery agencies, particularly in sections concerned with fisheries management. In the case of the BOBP-assisted activities, this has resulted in some of the agreed activities not being followed up by the counterpart agencies.

During discussions with concerned parties in Sri Lanka, the study team found a high degree of satisfaction with the activities of BOBP 3. This was particularly so on the part of the aquarium fish collectors themselves, who attributed many of the positive developments that have occurred – such as formal recognition of their profession, issuance of identity cards (to assist relations with security forces patrolling the Colombo Harbour security zone) and organisation of fishermen's groups – to BOBP-generated activities. At a higher level, senior Government officers consulted recognised that the organisation of the industry at all levels had been assisted by BOBP, whose activities may have further accelerated the growth of an industry already expanding rapidly.

MFARD is keen on further improving management of the ornamental fish sector by developing a precautionary plan of management, which will involve all the key stakeholders. The Ministry is in the process of amending the Fisheries Act and establishing a working group to evolve the precautionary plan. Given the government's concerns for fisheries resources and development and the enthusiasm of the stakeholders to ensure some sort of a sustainable future, it seems reasonable to expect that these concerns will translate into policy and action. MFARD has taken an important step at the request of the stakeholders, and proposed the establishment of a high-level task force to oversee and coordinate the conservation and management of critical aquatic resources and habitats. However, given the multi-sectoral nature of the problem, progress may be slow and will need facilitation and support. With adequate capacity building inputs to DFAR and technical assistance to the task force, a lasting national effort towards conservation and management or ornamental fish resources and habitats should be possible.

He was a lovable character

By Mahinda Rajapakse

Sri Lanka's Minister for Fisheries and Aquatic Resources Development pays a moving tribute to Dr Anton Atapattu, Director-General of the Department of Fisheries, who died recently. This article is reproduced from the Daily Mirror, *Colombo, of June 8, 2000, with the kind permission of the Editor.*

In the death of Dr Anton Atapattu, Sri Lanka has lost an expert of very high calibre and a very able advisor. He leaves a great void which cannot be filled for quite some time.

Looking back at the knowledge, experience, management skills, international exposure and academic achievements of Dr Atapattu, acquired during the last 28 years, I begin to realize that the choice made by the late George Rajapakse to recruit Dr Atapattu to the Department of Fisheries was far-reaching and wise.

Dr Atapattu had an unchallenged reputation as an expert and I had no hesitation in appointing him to the newly created post of Director-General of the Department of Fisheries and Aquatic Resources in January 2000. I knew that he had far-reaching plans for the development of the fisheries sector. With his new position and new responsibilities he would have made an unparalleled contribution. Dr Atapattu was an affable and friendly character who never got ruffled. His commitment to his official duties always took priority over anything else.

Dr Atapattu joined the Department of Fisheries in May 1972 as a District Fisheries Extension Officer. He became Assistant Director of Programme and Planning in 1980. It did not take him much time to get promoted as Deputy Director of Fishery Development. In this capacity he handled a number of foreign-funded projects and the success of these projects took him to the position of Director Fisheries in 1982. During this period, he concurrently held the posts of Acting Chairman of Fishery Harbours Corporation and President of the Sri Lanka Fisheries Cooperative Federation.

By the year 1989, Dr Atapattu had gained international recognition as a fishery management expert and was in great demand from various foreign fishery organizations . In September, 1989 he was called to function as Fisheries Credit Advisor for Eastern Caribbean states. Once again, in 1997, he was called upon to serve as Fisherfolk Organizations Development Advisor of the Ministry of Agriculture, Fisheries and Rural Development in Barbados, West Indies. In Barbados, he planned and organized fisherfolk and set up national organizations for better management of fisheries. On his return, after the two-year assignment abroad, Dr Atapattu was appointed to the newly created post of Director-General.

During my stint as Minister of Fisheries and Aquatic Resources Development, I was impressed by Dr Atapattu's deep knowledge of the fishing industry and his desire to document his knowledge so that others could benefit. He has produced research papers of very high quality, an example for others. He attended some 30 international conferences and symposia on fisheries. At the time of his demise he was the first Vice- Chairman of the FAO Sub-Committee on Fish Trade.

In the sphere of academics, he focused attention on his professional working environment. This is reflected in his PhD thesis on the subject "Bio-economic Management of Tuna Fisheries in the Indian Ocean with special reference to Sri Lanka." He served as a visiting lecturer in three universities and also at the Central Bank Staff Training College.

The loss of this lovable expert is a great shock to his colleagues and friends. From what I hear in the rooms and corridors of this Ministry, it will take a long time for all of us to get over this shock. On behalf of everyone associated with fisheries, I express my deepest sympathies to his beloved wife Sherin Atapattu and his daughter.

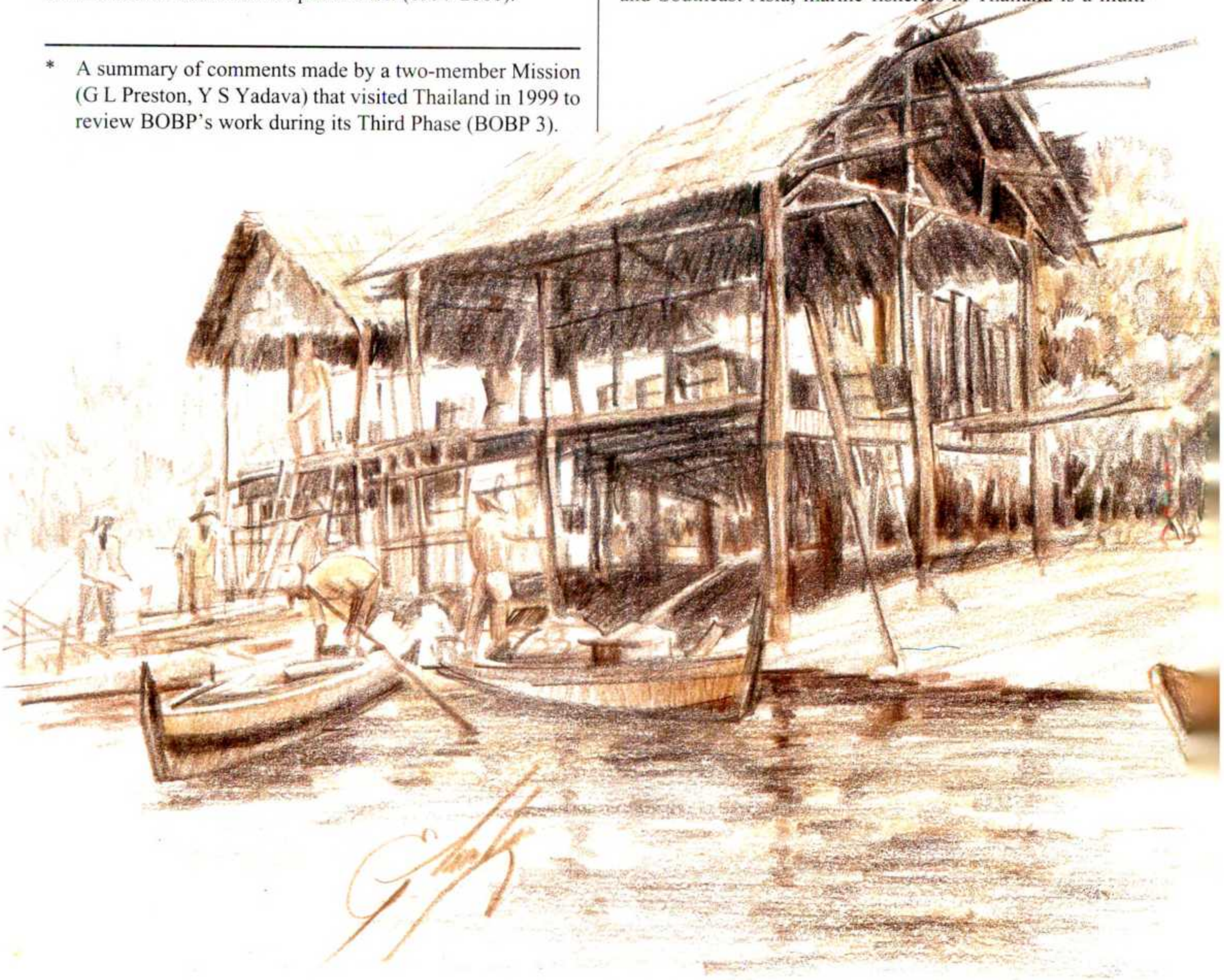
Documentation of Learnings, Thailand*

"The Bay of Bengal Programme during its Third Phase has been highly successful in Thailand. The Project stands out as a big success story."

Since the launching of the First Five-Year National Economic and Social Development Plan in 1961, fisheries development has been an integral part of the social and economic development of Thailand. The fisheries sector now contributes significantly to the country's economy, and in particular to food and employment generation. Under the Seventh National Economic and Social Development Plan (1992-1996), increased attention was given to the rehabilitation of fishery resources and fish habitats in the Thai marine waters through more effective fisheries and environmental management measures. The same strategy has been adopted with renewed vigour by the Thai Department of Fisheries in the current Eighth National Economic and Social Development Plan (1997-2001).

The Gulf of Thailand (FAO Statistical Area 71) and the Andaman Sea off the west coast of Thailand (FAO Statistical Area 57) comprise the major fishing areas of Thailand. The Andaman Sea, with an area of about 126 000 sq. km and a coastline of about 740 km. is deeper than the Gulf of Thailand. In the Andaman Sea, from Phuket Province to Ranong Province, the continental shelf is narrow and the sea bottom mainly comprises muddy sand and coral remnants.

Small-scale fishermen are important constituents of the fishing industry in Thailand and account for nearly three-quarters of the total fishermen population. As in other countries of South and Southeast Asia, marine fisheries in Thailand is a multi-



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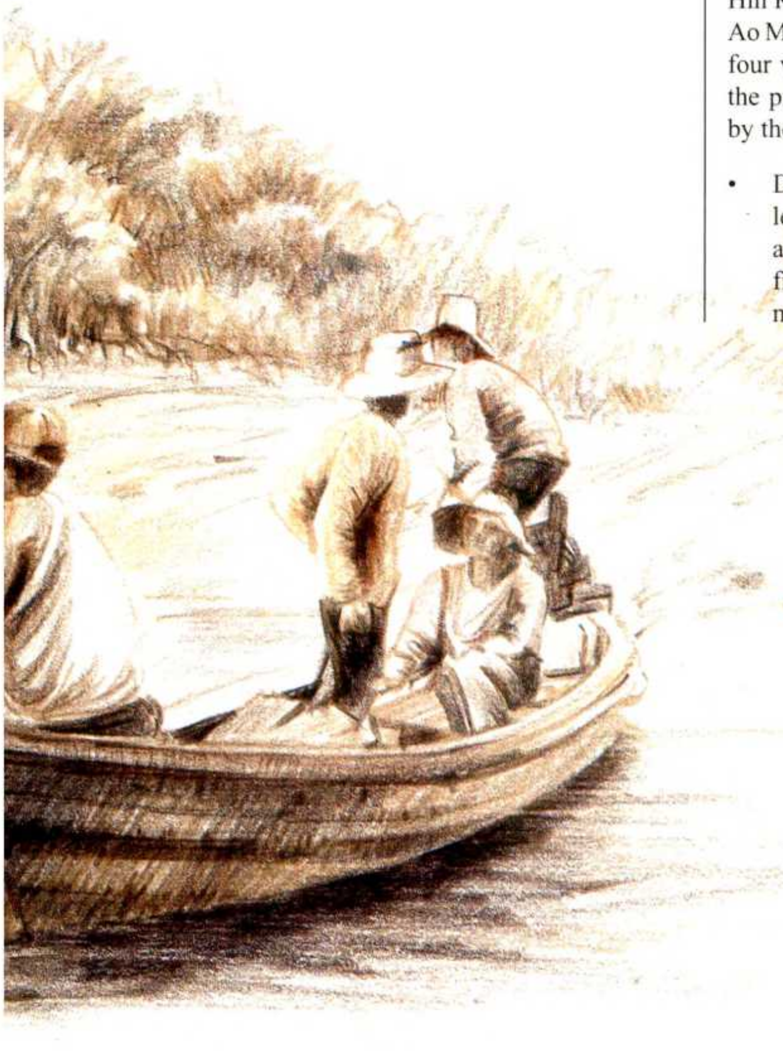
gear, multi-species fisheries, conducted by a large number of small-scale fishermen. Trawl netters of various sizes, followed by gill netters, dominate the marine fisheries.

Several factors such as improved economy, imported fish capturing devices, fishing technologies and methodologies and rapidly increasing demand in the domestic and foreign markets for fish and fish products have induced rapid marine fisheries development during the last 3-4 decades in Thailand. This has, in turn, resulted in a drastic decline in the abundance of coastal fishery resources, both in the Gulf of Thailand and the Andaman Sea. As a consequence of depleting stocks, conflicts between small-scale and commercial fishermen have been rising.

The theme of the Third Phase of BOBP in Thailand, as suggested by the National Economic and Social Development Plan, focussed on development of community-based participatory approaches to the management of fisheries and aquaculture in a coastal zone context. Phang Nga Bay along the Andaman Sea coast of Thailand was selected as the focal site, with the Department of Fisheries (DOF) as the main implementing agency. A few Non-Governmental Organisations (NGOs) and universities were also identified as implementing agencies. Presently, Mr. Jate Pimoljinda, Director, Andaman Sea Fisheries Development Centre, Phuket, is the National Project Coordinator.

Phang-Nga Bay, with an area of about 1,960 sq. km, is considered the most important bay on the Andaman coast of Thailand, covering parts of Phuket, Phang-Nga and Krabi Provinces of southern Thailand. There are 114 villages located along the Bay with a population of approximately 0.1 million. Fishing and aquaculture activities, followed by tourism, comprise major occupations of the communities residing in the Bay.



In the past, tin mining in Phuket, Ranong and Phang Nga Provinces was the main cause of marine pollution, affecting the health of coral reefs and the seagrass bed. With the decline in tin mining activities in recent years, the main cause of pollution is now effluents released from the growing number of houses, hotels, and restaurants and from tourism, especially in Phuket Province. As a microcosm of Thai fisheries, Phang-Nga Bay displays almost all the problems encountered in Thailand.

The Situation Analysis in Phang Nga Bay identified progressive use of harmful fishing practices, reduction in demersal catch, over-exploitation of both pelagic and demersal fisheries, changes in species composition, difficulties in enforcement, degradation of the fisheries habitat, pollution caused by sedimentation, increased nutrients from industrial sources, and conflicts between small-scale and large-scale fisherfolk, as key issues. The Analysis also brought out the Government's keenness to develop management approaches facilitated by the establishment of marine parks, the deployment of village-based artificial reefs, and better enforcement by improving people's awareness and participation.

During the first year of the DOF/BOBP Third Phase, the objectives, design and early implementation of a CBFM Project in Phang Nga Bay on the issues identified by the Situation Analysis were developed. Introduction of community-based fisheries management (CBFM) started in four villages – Ban Hin Rom, Ban Klong Kian, Ban Haad Sai Pleug Hoy and Ban Ao Makham. Based on the initial success of the Project in these four villages, more than 10 villages are presently involved in the programme. Some of the important activities undertaken by the project so far include:

- DOF/BOBP CBFM Workshop in which fisherfolk, village leaders, government officials, NGOs, universities, BOBP and FAO participated. It was for the first time that the fisherfolk met with government officials to plan fisheries management.

- Release of juveniles of tiger prawn, blue swimming crab and sea bass in five villages of the Bay. This activity is ongoing and is being rotated between Bay villages.

- Rehabilitation of mangrove and sea grass area.

- Setting up of cages in four villages to place gravid female crabs caught by fisherfolk. Once the crabs release their eggs, the crabs are sold and the profits are used for village CBFM activities.

- Sensitizing push-net fisherfolk to give up their destructive push nets. Supply of gill nets to encourage greater compliance of the push-net ban.

- Public hearings (bi-monthly) with fisherfolk in the Bay, with more and more suggestions for resolving problems of resource degradation and pollution.

- Training of fisherfolk in data collection techniques and establishment of standard data protocols on catch, habitat conditions and bio-indicators.

- Establishment of volunteers for surveillance of illegal fishing.

- Setting up of revolving funds.

Representatives of the fishermen community interviewed were very supportive of the activities initiated under the Project. They were of the view that after they joined BOBP, the message of conservation has spread and the villagers now realise the importance of conservation. Protection of sea grass close to the shore is their own idea, and marker buoys are placed to demarcate such zones. This demarcation has helped in conservation of juveniles of many fish species, thus enhancing the fisheries. In the sea grass area, the use of environment-friendly gear is now propagated by the fishermen. Some 60 fishermen have formed a co-operative society, and a revolving fund has been set up for uses such as village development, soft loans to fishermen, gear procurement, etc. Presently, four villages in the Bay have set up the revolving fund.

The most significant impact due to the Project's activities (like release of gravid females of crab species) has been in increase of fin and shell fish landings and the increase in catch per unit effort (CPUE) from 8 to 10 kg/boat/day. This has also increased fishing effort in the Bay, and it is felt that this could have an impact on the fisheries in the long run. However, the fishermen were of the view that in case the CPUE goes down in future, the fishermen would be advised to reduce effort in the area. This development has brought out the need for a sound sampling programme to continuously monitor commercially important fisheries so that corrective measures can be taken as and when there is shift in the CPUE.

The Mission observed that while there has not been much impact on the use of environment-friendly gear, conservation aspects appeared to be more clear to the fishermen now. However, the DOF is of the opinion that the use of destructive gear is on the decline. One village has set a good example, other villages can also follow this example. The villagers are receptive to the idea of conservation and sustainable development. The DOF is also of the view that if the programme continues, conservation and development of the resources would be much faster since the initial difficult stage of sensitizing the fishermen is over. Whatever fishermen have learnt will continue since they are now convinced of the benefits of conservation.

Sea ranching of commercially important finfish and shellfish species has been one of the important activities pursued by the Thai Department of Fisheries during the last two decades. While no study seems to be in place to assess the impact of sea ranching in Thai waters, the DOF correlates the increased landings to sea ranching. Under the DOF/BOBP Project, juveniles of tiger prawn, blue swimming crab and sea bass have been released to not only increase the abundance of stocks of these species in the Bay, but also to inculcate the idea of conservation amongst the fishermen. To sustain sea ranching in the future, greater emphasis would be required on hatchery-based seed production and related aquaculture activities. Issues such as supplementary feed of animal origin, trained manpower, disease management, etc. would have to be considered more carefully while pursuing large-scale sea ranching programmes.

Many recommendations of the Workshop on Community-based Fisheries Management held during 14-16 February 1996 at Phuket (RAP Publication 1998/3; BOBP Report No. 78) enhanced the Project.

Meetings with fishermen groups at regular intervals have been a strong point of the work programme. The meetings are held at bi-monthly intervals, and have helped find solutions to many critical issues. Besides fishermen and DOF officials, district leaders, health officials and police officers have taken part in these meetings. The participation of representatives of the Fishermen Association of Phuket (representing commercial-scale fishermen) has helped foster a better understanding between the small-scale and commercial fishermen groups.

The DOF had some NGO groups participating in the Project in the beginning, but they later withdrew from the Project. There are many strong NGO groups in Thailand dealing with coastal fisheries management. The DOF is of the view that it would be most appropriate for the NGOs and the villagers to handle the projects themselves. The DOF also wanted contact with the NGOs to be established through the DOF, and not directly.

The Mission observed extensive rubber plantation and shrimp aquaculture activities in the catchment area of the Bay. The run-off from such activities would be instrumental in increasing the nutrient load in the Bay, leading to higher eutrophication levels. To minimise such impacts it is essential to integrate all the stakeholders into the Programme and ensure their participation. Presently, only those fishermen who are not boat owners or who work on shrimp farms are actively participating in the programme. Participation of the boat owners and those who own shrimp farms or rubber plantations should also be ensured in the discussions to make the exercise more productive.

Gender involvement in the Programme and its sensitivity to the objectives of CBFM could not be assessed directly. However, the feedback the Mission obtained during discussions with fishermen revealed that while the women fisherfolk in the target area are not involved directly in fishing, they play an important role in marketing and processing activities. They are also happy with the fishery conservation programme and would like the activities to make further progress.

The advantages of a regional project *vis-à-vis* a nationally executed programme (with or without external funding) was raised during discussions with DOF officials. There was strong support in favour of a regionally executed project due to various reasons. A regional project enables a country to share ideas and experiences in areas of common interest with other countries. Regional projects have a certain flexibility, which makes them more successful than nationally executed projects. Fishermen are proud to be part of a regional project, and this feeling has contributed substantially to the success of the project. The information contained in BOBP Newsletters was appreciated as being wide in scope and application. The DOF officials were also of the view that the results of projects carried out by BOBP in other member countries could be considered for implementation by Thailand at an appropriate stage.

Several other issues relating to CBFM surfaced in the discussions with stakeholders. It was generally felt that CBFM alone may not be the panacea for all ills plaguing the fisheries sector. It needs to be supported by technological developments and a legal framework wherever necessary. Issues such as technological back-up to check proliferation of seagrass, ways to resolve multi-user conflicts, empowerment of the coastal communities, quantification of juvenile abundance in the sea grass area, cap on effort, etc. came up in the discussions.

The Mission was informed that many activities complementary to the BOBP Project are being undertaken by the Andaman Sea Fisheries Development Centre, Phuket. These include collection of catch data (including species composition and size distribution of economic species), training for data collection, data on the value of the catch landed, and some socio-economic aspects. The catch statistics from 1995 till date are available. The DOF also has an experimental project on the colonisation of seagrass beds for the Andaman Seas. The Ministry of Science and Technology has established a committee to study all types of pollution in the coastal areas.

During the course of discussions with the DOF staff and the stakeholders, some constraints in implementation of the Programme and suggestions for future consideration figured. The DOF was of the view that while the budget for implementation of the Project may not have been a constraint (about US $ 20 000 were available), the availability of capable and willing manpower was an impediment. Therefore, even if a national budget was available, there was no provision to use it. A consultant to provide regular assistance was needed.

Engagement of new employees/personnel for the Project was essential. Only short-term ad-hoc arrangements were made, which did not serve the purpose. DOF provided only a temporary biologist (Mr. Sakul Supongpan) to assist the Project. The Project should have allocated funds for hiring experienced workers. Organisation of domestic tours was also difficult at times.

The need for more ideas /technologies on post-harvest aspects (focus on value addition) was felt. There should have been greater regional exposure in this subject. Depending on the availability of funds, representatives of the communities engaged in the Project could be taken on tour to observe success stories elsewhere. Villagers were of the view that an ice plant or cold storage could improve their income, since the catch would be in a better condition for marketing. The findings and learnings of the Phang-Nga Bay should be documented and distributed to other areas in the coastal region. DOF believed that a Situation Analysis should be done at the end of the Project as was done in the beginning.

The BOBP3 has been actually implemented only during the last three years. The first two years were taken up in planning. The Department believes that the Project should be extended for at least another five years. This request takes into account the needs of the fishermen who would like the Project to be extended to pursue community-based fisheries management. The Mission feels that the delay in starting of the Project justifies the request of the DOF and of the Project fishermen for extension of the project for a reasonable period. The Project is quite essential to the Department of Fisheries (DOF), and if BOBP does not continue, the DOF will set up its own programme to continue the activities.

Another CBFM project has already started in the Gulf of Thailand (Bang Sapan District, Prachuas Kiri Khan) as a nationally executed programme.

Summing up, the Bay of Bengal Programme in its Third Phase has been highly successful in Thailand, and terminating the Project at this stage may not be worthwhile. The Project stands out as a big success story. Work carried out in Phang Nga Bay could be replicated elsewhere in Thailand and also in the Bay of Bengal region. While a strong national commitment to take up similar work was apparent from the discussions, it would be worthwhile to pursue and ensure a logical conclusion to the III Phase activities, even if it means extending the Project. A vacuum left by the Third Phase for national execution would not be constructive – because project officials working at Phang-Nga Bay may lose their momentum, and the interest of the fisher community in fully integrating the objectives of the Programme in their day-to-day activities may slacken.

Cage culture in Thailand

Contradictions in Sustainability*

The concept of sustainability is riddled with conflicts and paradoxes

Stephen Dovers & John Handmer

Sustainability has emerged as an umbrella concept beneath which integration of the many interrelated issues of environment and human development can occur. There are two distinct aspects to this. The first is the overarching concept of **sustainability,** which is the long-term and difficult goal of reaching an ecologically sustainable state. The variable process by which we might move somewhat nearer to this goal is **sustainable** development, a subsidiary notion. The two are not the same.

Sustainability has been discussed intensively in the past few years, and it is not surprising that contradictions within the concept are now emerging. Sustainability is indeed characterised by deep-seated contradictions – paradoxes, conflicts and tensions – between perhaps irreconcilable goals or directions. Here, we comment on eight of the most common contradictions.

1. Technology and Culture: Cause vs Cure

This contradiction is really a paradox and, with human over-population and wastefulness, is a key underlying factor of the global environmental crisis. Humanity's natural inclination for culture, in all its forms, and of which technology is as tangible example, is the basic reason why we can impact so heavily on our environment (the 'techno-addiction' described by Boyden (1987). The development and application of technology for practically all purposes has enabled, and indeed continues to encourage, an increase in our consumption of resources and production of wastes. There is no general questioning of the implicit assumption that virtually any application of modern technology is necessary or desirable. Problems of human and environmental cost are often acknowledged, and further applications of technology are sought to resolve them.

Yet the same aptitude for culture that is the cause of our dilemma offers the only means of moving towards sustainability and is the 'eco-cultural paradox' of Boyden & Dovers (1992). It is of course only our cultural ability to reason, communicate, plan and invent that allows us to contemplate desirable change.

2. Humility vs Arrogance

Despite an ever-increasing quantity of information, our comprehension of the global environment is characterised by greater and greater uncertainty. This has been termed the 'ignorance explosion' (Smithson 1992). To a western culture underpinned by a belief in the certainty and resolving power of science and technology, this is a disturbing situation, and the realisation of this may even be a threat to the social fabric (Ravetz 1986). Current policy-making processes are not good at recognising and coping with uncertainty.

We need the humility to acknowledge that none of us is or ever can be all-knowing. At best our knowledge will always be incomplete, while at worst it may be wrong in every respect. We need humility to maintain an open mind on new knowledge and experience, to listen to new ideas and leaders, and to ensure that we are flexible enough to deal with entirely new circumstances (see contradiction 7).

At the same time, we must have the arrogance to make decisions in the face of this inevitable ignorance. Curiously, at present we seem to have humility only in the face of the status quo, and arrogance mainly in terms of defending it.

3. Inter-generational vs Intra-generational Equity

Inter-generational equity, or justice between generations, is the ultimate moral principle behind the notion of sustainability. However, simply assuring resources for the future is seen by many as inadequate if the grotesque inequalities in the world today continue. These disparities are most obvious between the industrialized and industrializing worlds, but exist even within the world's richest countries.

But if resources are to be held over for the future, can enough of them be made available at present for those millions of humans who now lack even their most basic needs? Simplistically, either the resource supply is enlarged or redistribution occurs, and the former options seems increasingly unlikely on the ecological evidence. As the World Commission on Environment and Development (1987) noted, if the developing and less developed world was brought up to the consumption level of the industrialised countries, a five-fold increase in total load on the biosphere would result, as measured by energy use. Can we contemplate a five-fold (or more) escalation in the rate of environmental degradation?

Massive redistribution of resources – physical, economic and environmental – thus appears to be the ecologically defined avenue. The profound conflict is political, because it would seem that any realistic scale of redistribution must be judged in the West as politically impossible.

4. Growth vs Limits

In the view of some people, the joining together of the two words 'sustainable' and 'development' produces a self-contradiction. This view would see 'development' – equalling the kind of economic growth that is so widely experienced in the modern era – as being thoroughly unsustainable in that it is the actual cause of our ecological predicament. Others see a different, less environmentally damaging form of growth in the future as possible and indeed essential.

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* This is an abridged version of an article first published in *Environmental Conservation* 20 (3) 217-23. Reproduced here with kind permission from its editor, Professor N Polunin.

Certainly, constant growth in an intellectual, spiritual or artistic sense would be environmentally feasible; but growth as currently understood is largely a physical or material concept. The notion of endless growth in material consumption and in the environment load of the human population raises the prospects of ecological limits. If there are eventual limits, as would seem to be the case, humanity has certainly come much closer to them than ever before – or, as some suggest, may even have exceeded them already (Meadows et al 1992). It is of course far more politically palatable to suggest that economic growth can continue, albeit redefined, than it is to suggest that it has reached or will inevitably reach, some limit.

5. Individual vs Collective Interests

The notion of individual choice is a basic tenet of the political and economic arrangements of western cultures. In practice, individualism is epitomised by, among other things, our automobile culture, our attitudes to land tenure and our seeming preference for smaller and smaller household units. But environmental issues, and sustainability generally, are overwhelmingly collective problems arising from the sum of individual preferences and consumption. Those who consume little will bear the costs of total consumption just as much as those who consume a great deal. So the tensions between individual and broader goals are thrown into sharper contrast.

This tension also exists internationally. The rights of nations are fundamental to the modern world order, even if reality for many smaller countries might be very different for nations and for the macro-scale building blocks of the human world. There are obvious conflicts in balancing the rights and conversely, the responsibilities of individual nations regarding global environmental damage. For example, Australia uses less than 1% of the world's primary energy but has one of the highest per capita rates of usage. On what basis is Australia's contribution to reducing global CO_2 emissions to be judged?

6. Democracy : Diversity vs Purpose

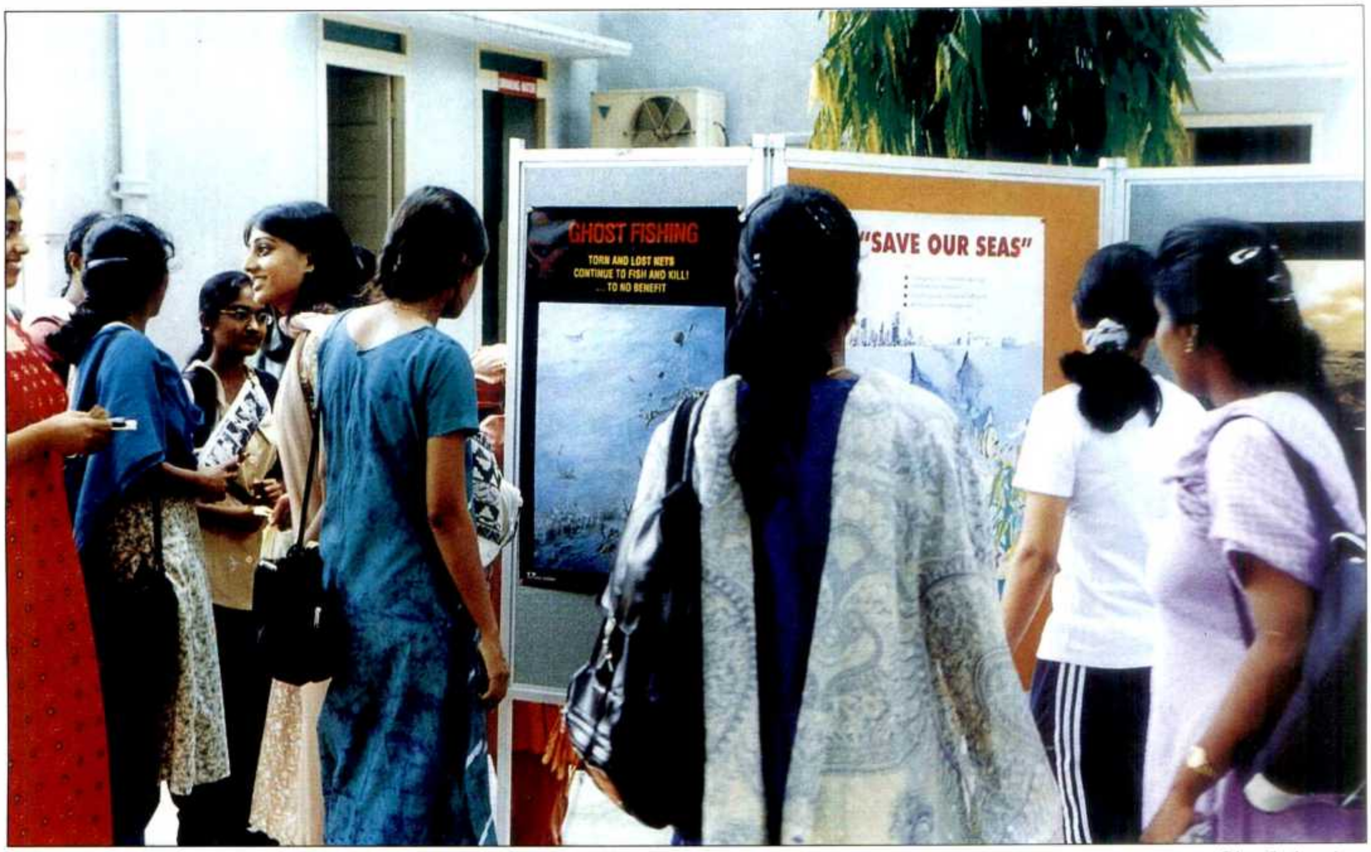
Issues of conflict also arise in questions of preferable social and institutional arrangements. Often, after looking to the

Stella Maris Girls Pledge to Protect the Environment

The Stella Maris College in Chennai has launched "Bhoomi Vandanam" (Tribute to Mother Earth), a series of programmes to create awareness on environment and pollution issues among students.

Ms. Anna Thomas, Treasurer of the Students Union, said "We are 2800 in all. An active core group among us motivates students to protect the environment and combat pollution through various programmes".

The Inaugural Day was marked by a dance performance and a display of beautiful posters put up by the students of the college. The BOBP was also approached to display its posters. Select BOBP posters and publications were distributed to students.


GHOST FISHING
TORN AND LOST NETS CONTINUE TO FISH AND KILL! ... TO NO BENEFIT
"SAVE OUR SEAS"

Pic. E. Amalore

natural world for answers to our human environment problems, the idea of diversity has been mooted. The basic idea is that in diversity, as opposed to its absence, there lies a greater range of potential answers to problems and a swifter ability to response: a movement away from the immutable, centralised and monolithic structure of industrialised societies is thus indicated.

However, while such an approach may encourage local responsibility and local action, the situation at the global level requires collective international action. A competent democratic handling of local environmental issues may well be swamped by global environmental change, unaddressed because of the impracticability of common-purpose action in a world that is structured by a myriad of unconnected autonomous regional economies which are going about their own business. Self-determination and participatory democracy are promoted as basic rights; but the paradox is that this aim may contradict the need for purposeful action at the global level.

7. Adaptability Vs Resistance

Modern industralised societies and their institutions are particularly good at resisting major change, which is paradoxical for structures set up by that most adaptable of species, *Homo sapiens*. One side of this is that the strength of these societies is their ability to perpetuate themselves. Unfortunately, this very success at maintaining the basic social structure is a major impediment to making the major changes that are necessary for sustainability, as a reactive form of resilience is far more common than a proactive form (Dovers & Handmer 1992). Institutions which have spent most of their existence actively resisting change are likely to find sharp redirection difficult; change is likely to be deferred or resisted until it happens in a very painful way.

8. Optimisation vs Spare Capacity

Another basic assumption lying behind our current situation is that of optimisation: to make the 'best' possible use of such resources as are available within a given constraint set. This notion supports neo-classical economics in particular, and public policy processes generally – unused resources are viewed as waste , and everything that can be used is defined as a resource.

From an environmental viewpoint, the critical result of this goal of optimisation is that we tend to view unused resources as a waste, and, to make up for this, expand use to the limit. Using the environment to the fullest possible extent, we leave over very little of the spare capacity that may be so useful, when confronted by the need to change. In a fully utilised world, change even at the operational margins has greater human and environmental costs. This is particularly the case in marginal environments and for those who dwell in them – generally the poor and dispossessed. Spare capacity would appear to be desirable for sustainability. But the conflict is that fuller and fuller use of resources is a moral and survival imperative for those who lack basic needs.

Conclusion

What are the implications of these contradictions and paradoxes for the future of humanity and the achievement of an ecologically and humanly sustainable world? There are three possibilities. First, the above discussions point to pessimism as an obvious and logical position: the deep-seated nature of these contradictions indicate that they are perhaps insurmountable. The magnitude of the problems of environment and development can be overwhelming enough, let alone when matched with the magnitude of the cultural and political obstacles.

Second, it may be that confronting these contradictions is simply an unavoidable part of the process of societal change on the pathway to sustainability. In that event they should become increasingly visible and problematic, and then in time be steadily resolved as societies adapt their structure and functioning to new ecological realities.

Third, the existence of these contradictions *per se* may not be as big a problem as at first glance. We humans are fully capable of holding apparently contradictory beliefs while undertaking actions which conflict with all our beliefs. This ability to live with paradox may ultimately prove to be a great strength, enabling us to make quite rapid shifts and changes in priorities as global ecological constraints are realised and redefined.

This brief exploration of the contradictions in sustainability can end with yet another: are these conflicts too great to be resolved, or does our apparent innate ability for logical inconsistency represent an avenue for escape? Can we find our way through the labyrinth of contradictions that sustainability represents?

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Cleaner Fishery Harbours in the Bay of Bengal: IMO-supported project strengthens infrastructure, information base and awareness

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Workshops, pilot projects in Vizag, Phuket and Male, publications, a final consultation among key fisheries decision-makers of the region to discuss learnings and lessons and up-to-date concepts concerning harbour upkeep, the Chennai Declaration – these are some highlights of the IMO-supported project on Cleaner Fishery Harbours in the Bay of Bengal, which began in 1989 and concluded early this year.

In 1987, the International Maritime Organization (IMO) and the Food and Agriculture Organization of the United Nations (FAO) agreed that the two organizations should co-operate through the BOBP to address marine pollution in the Bay of Bengal region. Under the project "Cleaner Fishery Harbours in the Bay of Bengal," the BOBP was to implement IMO-supported pilot activities to reduce pollution in fishery harbours and thereby improve the harbour environment.

After an IMO appraisal mission in 1989, a pilot project to upgrade the reception facilities for garbage and liquid, dry and oily wastes in Visakhapatnam fisheries harbour, India, was formulated by IMO and later implemented by BOBP with the assistance of the Visakhapatnam Port Trust. Under the project, a road tanker was acquired to receive oily residues from harbour vessels. Garbage skips were provided at strategic positions to receive and take away wastes generated in and around the harbours. An information drive was launched - a video film was made, and billboards with slogans stood at select locations.

This was followed by a BOBP-IMO initiative to assess the status of important fishery harbours in the region. Surveys were conducted in select fishing harbours in India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand by teams of national experts in marine pollution and post-harvest technology. The findings were discussed at a regional consultation

organised in Penang, Malaysia, in December 1991.

The surveys for the consultation showed that the main activities in harbours - such as fish handling, bunkering, fish marketing and repair - generated pollutants in proportion to the size of the fleet and the number of people using the harbours. Oil leaks, bilge discharge, fish waste, garbage, inflow of industrial effluents, and sewage discharge were the main forms of pollution.

The consultation recommended a series of short-term measures (improving facilities for garbage collection and disposal, providing basic toilet and fresh water facilities in harbours, carrying out awareness-building among harbour-users and children on the need for a clean environment) and long-term measures (integrated effort by those responsible for the environment, urban planning, industrial development, health and fisheries; establishment of acceptable standards of water quality; in-depth surveys including one on the socio-economics of harbour development).

A series of pilot projects followed – based in Phuket, Thailand; Negombo, Sri Lanka; and Male in the Maldives. A comprehensive manual of information and guidelines about pollution in fishery harbours was brought out. A final wrap-up consultation on cleaner fish harbours and fish quality assurance was held in Chennai, India, on 25-28 October, 1999. A Chennai declaration was adopted by the participants.

- The Phuket pilot project was meant to improve the fishery port environment in Phuket. It was implemented by the Fish Market Organization in co-operation with the Phuket Marine Biological Centre, with assistance from the BOBP.

  The main project activities were a study tour for harbour personnel of three fishery harbours in Malaysia and two in Singapore, to study pollution control and mitigation practices; augmenting garbage reception facilities by providing a garbage collection truck and deploying garbage bins; and making available a mobile tanker with pump for oily waste reception and a quayside fixed tank for bulk storage; and an awareness campaign based on interpersonal communication and the use of video and slide shows, posters, stickers and signboards, and group activities.

- In Sri Lanka, the National Aquatic Resources Agency, did a baseline study of the Negombo fisheries harbour to collect information on the types and levels of pollution generated by various harbour activities, as well as the sources of pollution, and the existing facilities for reception and disposal of wastes. The National Institute of Fisheries Training undertook a KAP (knowledge, attitude and perceptions) stakeholder study to understand the perceptions and behaviour of the many harbour-user groups. An interesting finding was that many believed that fish caught in the deep sea could not be contaminated by harbour water; another was that using harbour water to clean the fish gave the fish a better taste. The KAP study has been published in Sinhala and widely distributed.

  The study's recommendations on the use of various media to create awareness about pollution were implemented. The Fisheries Radio Unit broadcast stories on harbour pollution and its abatement. Posters and stickers were prepared, distributed to stakeholders and displayed at town centres and schools at various fishery harbours. A high-profile exhibition was held on a "Cleaner Harbours Day" with panels highlighting the causes of pollution and what should be done to combat it. It was inaugurated by the Deputy Minister for Fisheries, and generated many stories in the local and national press. Since the KAP study pointed out that comic books are very popular among fisherfolk, an 8-page comic booklet on pollution abatement was produced and distributed.

- In the Maldives, an inter-Ministry meeting was called by the Marine Research Section of the Ministry of Fisheries and Aquatic Resources to discuss inputs and allocate responsibilities for a cleaner harbour environment. MRS entered into an agreement with an NGO, VESHI (Volunteers for Social Harmony and Environment) about an awareness campaign. This was launched on a national "clean-up day", when floating and submerged garbage from the Male harbour was removed with the assistance of the public, leaflets were distributed and billboards put up to highlight cleanliness messages. VESHI designed and developed awareness materials such as posters, billboards, leaflets and radio scripts. A video film was produced with inputs from Worldview International and the BOBP's Information Service.

- A significant project input was a "Fishery Harbour Manual on the Prevention of Pollution", written by two consultants. The book describes pollutants generated by harbour activities and contaminants that may find their way into the harbour from outside sources. It discusses the standards needed for water quality, and procedures to maintain standards. It discusses waste management and effluent treatment, and concepts, such as HACCP, designed to ensure fish quality. In sum, the manual is an invaluable reference guide for all harbour managers.

To build on the foundation of learnings from all project activities, and involve key decision-makers, a four-day Expert Consultation on Cleaner Fishery Harbours and Fish Quality Assurance was held in Chennai in October 1999. Some two dozen decision-makers from the region and two consultants discussed the design of fishery harbours and their infrastructure, fishery harbour management, seafood quality assurance, and the handling and storing of fish.

The Chennai Declaration passed at the consultation contained a useful package of recommendations. It called for wide stakeholder participation in the siting, planning and management of harbours, the factoring of resources availability in the design of harbours, mechanisms to promote inter-departmental co-operation; training for harbour managers in seafood quality assurance; rigorous enforcement of rules and regulations, including speedy removal of encroachments; training of harbour and landing site managers; a balanced

A montage of BOBP publications relating to the cleaner fishery harbours project

approach to privatization of fishing harbours and landing sites; development of a model fishing harbour; and support from FAO for developing such a model harbour.

Participants expressed appreciation of the contributions made by the IMO-supported Cleaner Fishery Harbours project to promoting awareness on harbour pollution, strengthening the information base, and catalysing action among all types of stakeholders.

The main information outputs from the IMO-BOBP co-operation on cleaner fishery harbours were:

Publications:

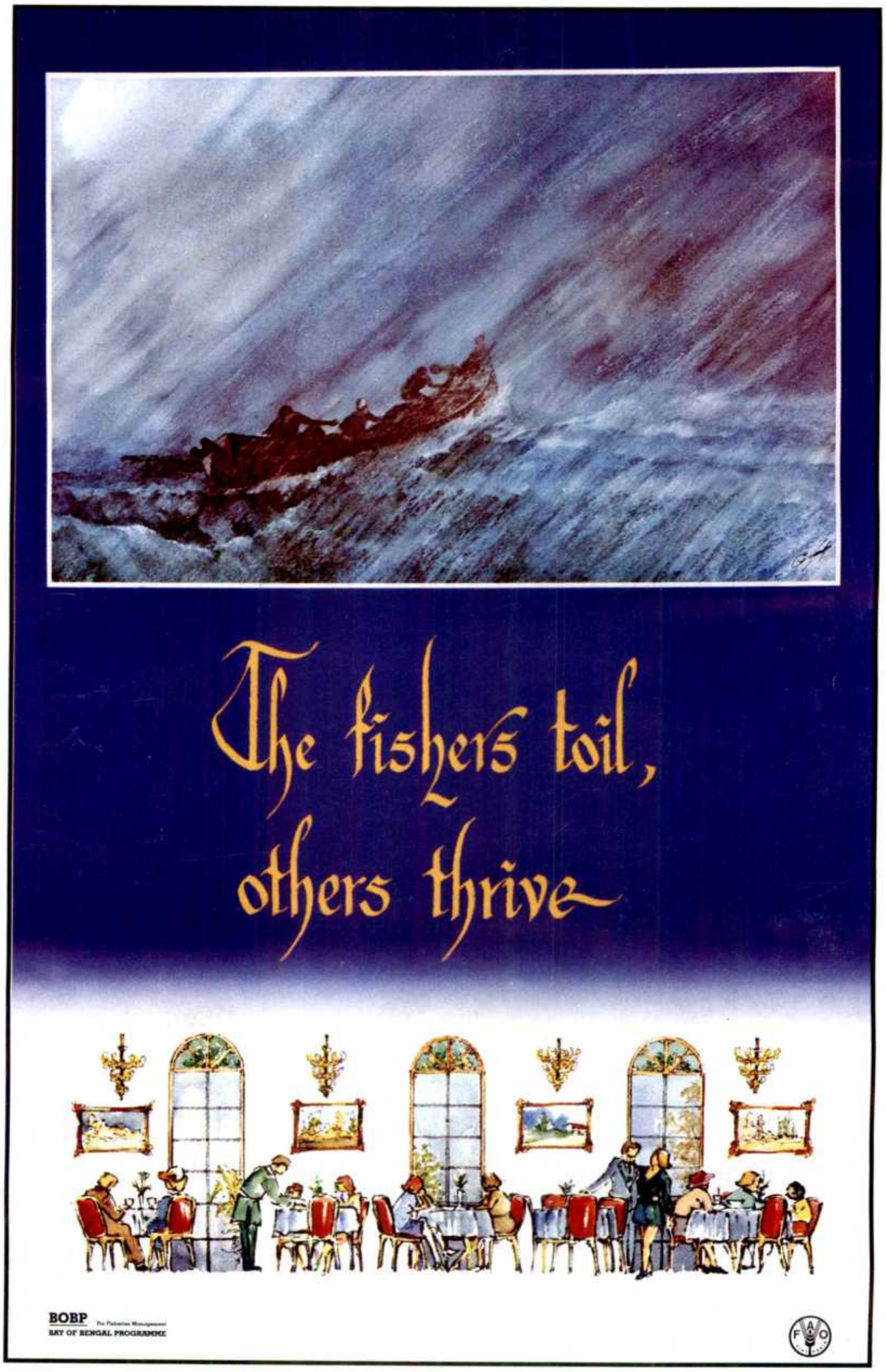
- Cleaner Fishery Harbours in the Bay of Bengal (1992) BOBP/WP/82
- Guidelines for Cleaner Fishery Harbours (a 16-page illustrated booklet) (1993) BOBP/MAG/17
- Dealing with Fishery Harbour Pollution - the Phuket Experience (1994) BOBP/WP/93
- Fishery Harbour Manual on the Prevention of Pollution (1999) by J A Sciortino and R Ravikumar BOBP/MAG/22
- Report of the Expert Consultation on Cleaner Fishery Harbours and Fish Quality Assurance (2000) BOBP/REP/84
- "Keeping your harbour clean: do's and don'ts" (leaflet for the Visakhapatnam fisheries harbour)

Video films, etc:

- Video film "Towards cleaner fishing harbours" in English
- Video film in Dhivehi for the Maldives
- Video film and slide show in Thai
- KAP (knowledge, attitude and perception) study of stakeholder perceptions in Sinhala
- Posters in all project locations: Visakhapatnam, Phuket, Negombo, Male.
- Photo exhibitions in Phuket, Negombo, Male and Chennai

S R Madhu

The latest poster from BOBP



BAY OF
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NEWS

Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional multi-agency fisheries programme which covers seven countries around the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The programme plays a catalytic and consultative role: it develops, demonstrates and promotes new methodologies, techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in the member countries. The BOBP is sponsored by the governments of Denmark and Japan, and by member governments in the Bay of Bengal region. The main executing agency is the FAO (Food and Agriculture Organization of the United Nations)

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BOBP and the Code of Conduct for Responsible Fisheries

Management of the set bagnet fishery in Bangladesh – which engages thousands of fisherfolk but endangers the resource – is a major challenge which the Ministry of Fisheries and Livestock is meeting courageously. One tool the Ministry can use in its support is the Code of Conduct for Responsible Fisheries (CCRF) which all stakeholders in fisheries must respect and follow in their own interest. This issue of Bay of Bengal News *explains the Code of Conduct and its technical guidelines, and reports in detail the National Workshop on CCRF organised recently in Chennai, India, by the BOBP.*

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A Word from the Editor

BOBP and the Code of Conduct for Responsible Fisheries

As a first step toward promoting implementation of the Code of Conduct for Responsible Fisheries, a National Workshop on the subject was organised by the BOBP in association with the Government of India at Chennai during 29-30 September 2000. The Workshop brought together the most senior fisheries administrators working with the Union Ministry of Agriculture and the State and Union Territory Governments, scientists and experts from fisheries institutions, and representatives from national and international NGOs. The objectives of the Workshop were to fully familiarise government functionaries with the elements of the Code and the technical guidelines that have been prepared by FAO to assist member-countries in implementing the Code. The output of the Workshop – an agreed plan of action for operationalising the Code.

The two-day Workshop highlighted several problems concerning implementation of the Code in a large country like India. Keeping in view the strengths and weaknesses of national and state governments, the vastness of the country and the diverse and highly complex demographic and socio-political fabric, the planners and experts concluded that massive efforts would be needed to take the Code to the grassroots level quickly in India.

Although much smaller in size and geographically and socio-politically more homogenous, island nations such as Sri Lanka and the Maldives, which I subsequently visited, also spoke of similar difficulties in implementing the Code – in fact the requirements were almost identical.

Learnings from the Chennai workshop and the detailed discussions with the authorities in Sri Lanka and the Maldives highlight the primary task of educating everybody about the Code. The Code needs to be popularised and effectively communicated, understood and also fully imbibed by everyone concerned in the fisheries sector – fish workers, investors, traders, processors, scientists, bureaucrats, politicians and others.

The BOB large marine ecosystem covers some of the most productive waters in the world and supports a large population of small-scale fishermen – some 6-8 million directly and some 35-40 million others engaged in ancillary activities relating to fisheries. Declining catches, environmental degradation, post-harvest losses, conflicts between large-scale and small-scale harvesters – such issues fast threaten the livelihood of millions of small-scale fishers in the Bay. Steady loss of productivity and biodiversity is also amply visible. Per capita consumption has already declined over the years.

The contribution of coastal fisheries to the region is substantial. Any decline in fisheries would severely impact the food security and national economy of the BOB countries. While governments in the region have recognized the need for better fisheries management and adoption of the Code, action has been lacking. Ignorance and lack of understanding are largely responsible. The constraints include not merely a lack of resources and technical expertise, but also the will and the determination to implement the Code.

The Code of Conduct for Responsible Fisheries, which was unanimously adopted on 31 October 1995 by the FAO Conference, is now five years old. Beginning with the 23rd Session of the Committee on Fisheries held at Rome during February 1999, FAO has also started reporting the progress achieved by member-countries in implementing the Code.

The recent Workshop in India and discussions with officials in Sri Lanka and the Maldives reflect the state of preparedness for implementing the Code in countries on the western side of the Bay. The situation is largely similar in member-countries on the eastern side (Thailand, Malaysia, Indonesia) of the Bay. In sum, implementation of the Code in most member-countries of the BOBP falls short of what is required. Massive efforts are needed on many fronts to help these countries put their act together.

The FAO is fully committed to assisting Member States in the efficient implementation of the Code. Special measures are needed to address the needs of developing countries, especially in the areas of financial and technical assistance, technology transfer, training and scientific co-operation. Developing countries must also enhance the ability to develop their own fisheries, participate in high sea fisheries, and improve their access to such fisheries.

BOBP, as a catalyst, facilitator and neutral coordinator, has been instrumental in sensitizing national governments on the needs of the Code from time to time. With its excellent networking, BOBP as an IGO can also be an ideal mechanism for assisting member-countries to implement the Code in areas relevant to its mandate in future.

This issue of *Bay of Bengal News* has attempted to popularise the Code and the FAO's nine Guidelines on the various articles of the Code. We hope that it helps better understanding of the Code and the promotion of sustainable practices. These could yield rich dividends by reducing poverty and enhancing food security in the Bay of Bengal region.

Y S Yadava

Many ideas, many insights, a new plan of action: Chennai Workshop moves the Code of Conduct forward

S R Madhu

"It's in the same category as motherhood and patriotism," said one delegate before the National Workshop started. "Everyone professes strong support. But when it comes to concrete action, it's limited, few even attempt it."

The delegate was talking about the Code of Conduct for Responsible Fisheries, and the occasion was a National Workshop on the subject, hosted by BOBP in Chennai from 29 to 30 September, 2000. As many as 43 delegates from the Union and State Governments, various fisheries institutions, NGOs, FAO and BOBP attended the Workshop. Incidentally, it was also the first occasion when the senior-most fisheries administrators from the Union and the coastal States and Union Territories had assembled to discuss the Code and arrive at an implementable plan of action.

For many of them, the Workshop marked the first systematic exposure to the Code of Conduct. "Five years after the Code came into being, there's a Workshop on the subject. It's late, but better late than never," said John Kurien, fisheries activist and Associate Professor at the Centre for Development Studies, Trivandrum.

This article is a round up of what happened at the Workshop. A few Workshop presentations are reported here. A complete account will be provided in characteristic BOBP style by a report to be published a couple of months from now.

Mr Mohan Verghese Chunkath, Tamil Nadu's Secretary for Fisheries and Livestock, made a terse and well-worded welcome address. He said that thanks to BOBP, Tamil Nadu had taken early action on the Code by translating it into Tamil and distributing it to fishermen's co-operative societies and other user groups. He expressed Tamil Nadu's delight and enthusiasm at the prospect of BOBP emerging as an inter-government organisation (IGO).

Mr M K R Nair, Fisheries Development Commissioner to the Government of India, warned of "death clouds" hovering above the seas if practices like overfishing, illegal fishing and dumping of wastes into the sea weren't curbed. The Code was timely and should be taken seriously by one and all. He said the key factor today is to ensure sustainability and make all the stakeholders active partners in adopting the tenets of responsible fisheries.

Dr Y S Yadava, Interim IGO Co-ordinator, briefly described the nature, scope and objectives of the Code. He also highlighted the activities undertaken during the three phases of the BOBP and the Programme's achievements during the last 20 years.

FAO Representative in India and Bhutan Peter Rosenegger berated mankind for its thoughtlessness. "We try to outsmart nature, pollute the air, do everything we shouldn't do," he said. There were two reasons why such behaviour was obnoxious. "Our life span is at most 100 years, Nature goes on for hundreds of thousands of years. We have no right to make the world unlivable for our children and grandchildren. Second, in nature, when one person commits a crime, it's others who suffer." Mr Rosenegger read out a message to the Workshop sent by Dr R B Singh, FAO Assistant Director-General, from the FAO Regional Office for Asia and the Pacific in Bangkok (page 5).

Mr N K Sinha, Secretary in the Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India inaugurated the Workshop and delivered a thoughtful keynote address (pages 6-8). He pointed out that while demand for fish is growing, production is falling, on account of factors that cry out for a Code of Conduct. He traced the Code's origin and described its features. Since the Code is elaborate and complex, it needs to be simplified. It must be translated into local languages, workshops must be held, especially at the grassroots level, to explain the Code's provisions.

Mr Sinha cited some decisions taken by the Government of India recently to implement the Code. Efforts were being made to optimise the fishing fleet size. A move to impose a uniform ban on fishing during monsoon months had been initiated. An expert group had been set up to prepare a comprehensive policy for marine fisheries. A Working Group of experts had been constituted to reassess the 1991 estimates of the potential yield of marine fishery resources. The Ninth Five-Year Plan for the fisheries sector had focused on an integrated approach to sustainable development but management had received inadequate attention. He suggested that adequate funds be earmarked for fisheries management activities in India's Tenth Five-Year Plan.

Complimenting the BOBP on its performance and its initiative in organising the Workshop, Mr Sinha said "the fullest and most effective implementation of the Code can only be through a viable partnership between the government, industry and society." He suggested that BOBP in its future role as an IGO should help the member-countries implement the Code.

After a coffee session, delegates reassembled to hear Dr. John Kurien talk about responsible fisheries and pose them the question: "Can it be achieved with a Code of Conduct?" He said that the movement of India away from responsible fisheries began with the neglect of the wealth of knowledge and technology that numerous traditional small-scale fishing communities possessed. The dominance of the state in setting the research agenda, choosing the technology and setting the administrative framework aggravated the problem. It curbed the initiative of the most important fisheries player, the fish worker.

Dr. Kurien laid down a set of pre-conditions for responsible fisheries. (See article on pages 9-16)

Dr V.S. Somvanshi of the Fishery Survey of India presented a useful and informative overview of marine fish stocks and their management in India. He said that annual marine fish production in India was about 2.7 million tonnes, while the maximum sustainable yield of fish stocks in the EEZ was estimated at 3.9 million tonnes. He suggested investigations into fish stocks and stressed the need for management regimes for various fisheries. Some recommendations: Legislation for coastal fishing craft and deep sea vessels should be compatible. Colour codes should be specified for every category of fishing craft and every fishing zone. Names of the craft and their registration numbers should be in large standard size to facilitate easy identification.

A long session of presentations by various coastal States and Union Territories followed. Representatives from Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Pondicherry, Andaman and Nicobar Islands, Andhra Pradesh, Orissa and West Bengal provided information and insights about their fisheries and their development and management problems. Most of them sought assistance from FAO and the Central Government.

Dr K. Gopakumar, Deputy Director-General (Fisheries) in the Indian Council of Agricultural Research, described the role of fisheries research in supporting fisheries management. For example, in marine fisheries, R & D organizations had developed fishing vessel designs, standardised quality control of marine products for exports and organised fish inspection. They had undertaken research in mariculture, pearl culture, the setting up of shrimp hatcheries, the utilization of fishing wastes, the application of electronic equipment in fishing. He suggested the creation of a Ministry of Fisheries. Fisheries science should be declared a technical subject like engineering. A standard course and degree syllabus should be set up at the national level.

The State presentations concluded in the morning of the second day of the Workshop. Then followed a lively talk by Mr K. Jose Cyriac, Chairman of the Marine Products Export Development Authority (MPEDA) on seafood quality assurance and eco-labelling. Talking about international quality standards for fish and fish products, he outlined the role of the Codex Alimentarius Commission, the ISO 9000 series standards, the Hazard Analysis Critical Control Point system. He also explained the role of eco-labelling and its role in promoting sustainably managed fisheries. He described MPEDA's work in promoting seafood quality.

Replying to questions, Mr Cyriac said that the Union Government could fund half the cost of turtle exclusion devices to be fitted on to trawlers for conservation of endangered marine turtle species. There were no national guidelines yet on eco-labelling, but it was a matter of time before they were formulated. He described as exaggerated the problems of women in fish processing units. More than 30,000 women from Kerala earned more than Rs 1,200 per month in fish processing units. Isolated and anecdotal issues had been blown up.

Mr Sebastian Mathew of the International Collective in Support of Fish Workers made an enlightening presentation on the application of the Code of Conduct to small-scale fisheries (pages 17-24). He pleaded for compatible legislative regimes on conservation and management at the national and state levels. He emphasised that it was essential to create a feeling of "ownership" of the Code among all players in fisheries. Only then would they take an active part in promoting the Code. Another important and urgent need was to address the numerous information gaps in fisheries. Better data collection tools were needed.

Dr Kee-Chai Chong, SEAFDEC Consultant, presented and discussed a checklist of guidelines on operationalising the Code. He emphasised on the need for guidelines based on the Code that met individual country requirements. The guidelines should be practical, specific and legitimate in the eyes of the stakeholders (See pages 25-27).

The post-lunch session of the second day was devoted to a panel discussion of key points and issues that had emerged from the Workshop. It was chaired by Mr N K Sinha. The session led to a Plan of Action (page 5). Sample points: The Code should be simplified, condensed and translated into vernacular languages, it should be popularized through street plays and comic books, fishing capacity should be maintained at optimum levels, there should be a uniform ban on fishing during monsoon months ...

The BOBP distributed a set of posters to every participant and a video film showing how a street play was used to popularise the Code in fishing villages around Chennai.

What did the National Workshop achieve? Better understanding. Vigorous interaction. Many new ideas and insights. Some useful recommendations. Most importantly, the Code of Conduct is now much more than a noble concept akin to motherhood and patriotism, it is a practical goal toward which all players in fisheries can constantly move.

Message from Dr R B Singh, Assistant Director General, FAO Regional Office for Asia and the Pacific, Bangkok.

I'm very happy that the Bay of Bengal Programme is organizing a National Workshop on the Code of Conduct for Responsible Fisheries.

The Code of Conduct for Responsible Fisheries has been correctly described as one of the most important international instruments devised for management of our planet's aquatic resources. It is global and all-encompassing in scope, directed at everyone concerned with the conservation of fishery resources and the management and development of fisheries.

The Code sets out principles and standards of behaviour for responsible practices in fisheries. It covers not merely the capture of fish and fishing operations, but the processing and trade of fish and fishery products, aquaculture, fisheries research, and integration of fisheries into coastal area management.

The FAO is happy to have brought the Code into existence in 1995. But its purpose can be served only when the Code is understood by all and given effect to by all – governments, international organizations, corporate firms, NGOs, officials, fishers and fishery-related individuals.

A special effort must be made to ensure that officials dealing with fisheries in the government are aware of the content, meaning and implications of the Code. Their ideas, inputs and advice are needed to propagate the Code. The present Workshop is therefore an essential and a very useful exercise.

The Code reflects the spirit, substance and effort of a number of FAO and United Nations initiatives, conventions and conferences. In organising this Workshop, the Bay of Bengal Programme not merely promotes the Code of Conduct, but furthers awareness and action on all these important global initiatives. Wider application of the provisions of the Code will promote sustainable and responsible fisheries and thereby help in achieving the goals of national and global food security.

I wish the Workshop and its organisers and all its delegates two days of constructive discussion and a lifetime of useful follow-up!

National Workshop on the Code of Conduct for Responsible Fisheries: Plan of Action

- The Code of Conduct for Responsible Fisheries (the Code) should be translated into vernacular languages. A simplified and concise version of the Code should be provided to the States/ Union Territories on a priority basis for translation into vernacular languages.
- The Code should be popularised through street plays, comic books, audio-visual presentations, etc. The electronic media should be considered for speedy dissemination of the Code.
- The coastal States and Union Territories should organise workshops/ meetings with various user groups for better understanding of the provisions of the Code and its implementation.
- The fishing capacity should be kept at optimum levels, commensurate with sustainability. The practice of multi-agency registration of fishing vessels, prevalent in some States, should also be reconsidered.
- The coastal States and Union Territories should consider formulating a clearer definition of access rights to the territorial waters and harmonise their zonation policy for different categories of fishing vessels.
- There should be a uniform ban on fishing during monsoon months.
- Resource enhancement programmes, such as setting up of artificial reefs and ranching with restricted access, should be undertaken, especially for species under threat or subjected to over-exploitation.
- Every coastal State and Union Territory should consider setting up a Resource Management Wing in the Department of Fisheries
- The coastal States and Union Territories should consider setting up Awareness Centres to popularise the Code and other activities concerning fisheries development, conservation and management.
- The Government of India (the Centre) and the States/ Union Territories should consider laying more emphasis on post-harvest requirements of the fisheries sector, including quality control of fish and fish products for both domestic and export markets.
- The research institutions under the Ministry of Agriculture and the State Agricultural Universities should aim at providing adequate research support to the implementation of the Code.
- The Centre and the States should endeavour to set up a sound information data base to meet the implementation requirements of the Code.
- The States and Union Territories should be provided with special assistance for implementation of the provisions of the Code.
- The Centre and the States should consider laying more emphasis on fisheries development, conservation and management aspects in the future Five Year Plans.
- The *subsidiarity principle*, which takes management to the lowest meaningful level to enhance participation, should be encouraged.
- The Centre should consider introducing model bill (s)/ legislation with the active participation of all stakeholder representatives for implementing those provisions of the Code which are presently not covered by legislation.
- The Centre and the States/ Union Territories should consider instituting reforms in the existing legislation on fisheries to meet the requirements of the Code.
- The Centre should consider bringing all fisheries matters, now divided among various Ministries and Departments, under one administrative umbrella.
- To check poaching/ illegal fishing in the Bay of Bengal, FAO/ BOBP may consider setting up a mechanism to enable the Bay of Bengal countries to interact regularly.
- A regional mechanism for study tours should be encouraged among countries around the Bay of Bengal to learn from one another's experiences in implementing the Code.

Keynote Address

Code of Conduct for Responsible Fisheries

N K Sinha

Secretary, Department of Animal Husbandry & Dairying
Ministry of Agriculture, Government of India

We take pleasure in presenting key excerpts from the keynote address at the National Workshop on the Code of Conduct for Responsible Fisheries held in Chennai

It is a great privilege to be invited by the Bay of Bengal Programme of the Food and Agriculture Organization of the United Nations as the keynote speaker for the National Workshop on the Code of Conduct for Responsible Fisheries.

This Workshop is being organised at the most opportune time. Fisheries faces a crisis all round the world and India is no exception. On the one hand there is a growing demand for fish and fish products due to many reasons. On the other hand, fishers find it difficult to meet the demand because of depleting catches despite increasing efforts.

For decades, maritime nations have pumped billions of dollars into expanding fishing fleets, subsidising everything from fuel costs to the construction of factory vessels. The open access nature of the fishery in a large part of the world, including India, has allowed unregulated entry. All these have led to extra fishing pressure, reducing fish stocks in many parts of the world to levels much below their sustainable yield.

Overfishing isn't man's only destructive act against nature. We have been continuously adding billions of tons of toxic substances into the sea. Habitat damage, industrial pollution, non-degradable effluents and wastes – all these have taken a heavy toll. About 97% of earth's living space is ocean. In other words, the sea is man's life-support system. But man's actions are fast destroying his own life-support system.

If we look at the world fin and shell fish production, there is a steady increase in production from 67 million tonnes (mt) in 1970 to 103.5 mt in 1990. The latest statistics for 1997 reveals that the world production from both capture and aquaculture reached the peak of 131 mt. During the period 1990 to 1997, a growth rate of 7.4% per year was achieved. However, the increase of about 27mt during this period was largely due to aquaculture. Capture fisheries showed undisputable signs of plateauing. This has been true for both inland and marine capture fisheries.

In India the trend is no different. The toal fish production increased from 1.76 mt in 1970-71 to 3.84 mt in 1990-91 and to 5.26 mt in 1998-99. During the period 1990-91 to 1998-99, an average growth rate of a little over 4.0% was achieved. In the marine sector the production increased from 1.09 mt in 1970-71 to 2.3 mt in 1990-91 and reached a peak of 2.97 mt in 1996-97. Thereafter, it came down to 2.95 mt in 1997-98 and 2.7 mt in 1998-99. During the period 1990-91 to 1998-99, an average annual growth rate of 1.93% was recorded in the marine sector.

Keeping in mind the annual marine harvestable potential of 3.9 mt, about 3/4th of the potential is being harvested. Since the present effort is largely restricted to the near-shore waters, it may be correct to say that further increments in marine fish production can only be achieved from the deep sea. As most coastal resources are being fished to their maximum sustainable limits, and optimisation of catches from deep sea still being a distant reality, we need to concentrate our efforts on the coastal resources and ensure that their sustainability is maintained.

The Code of Conduct for Responsible Fisheries or simply the Code, as it is popularly known, declares in its General Principles that ***"The right to fish carries with it the obligation to do so in a responsible manner."*** It sets out principles and standards of behaviour for such practices and aims at effective conservation, management and development of living aquatic resources. The Code covers not merely capture of fish and fishing operations, but the processing and trade of fish and fishery products, aquaculture, fisheries research, and the integration of fisheries into coastal area management.

The Code is global in scope. It is directed toward members and non-members of FAO, fishing entities, organizations of all kinds, fishers, people engaged in the processing and marketing of fish and fishery products – in short everyone concerned with conservation of fishery resources and management and development of fisheries.

The Code is an outcome of several contemporary global initiatives, which expressed concern about the over-exploitation of important stocks, damage to ecosystems, economic losses, and issues affecting the fish trade. All these threatened the sustainability of fisheries. The 19th Session of the FAO Committee on Fisheries, held in March 1991, recommended that FAO should develop the concept of responsible fisheries and elaborate a Code of Conduct toward this end.

Subsequently the Government of Mexico, in collaboration with the FAO, convened a Conference on Responsible Fishing in Cancun in 1992. A declaration was passed at this Conference which developed the concept of responsible fisheries. The Cancun declaration was subsequently critically assessed, strengthened, refined, elaborated and fine-tuned at a number of conferences by various groups, and the Code of Conduct for Responsible Fisheries finally came into being on 31 October 1995 at the 28th session of the FAO Conference in Rome.

The Code contains 12 articles plus two annexes. The resolution as contained in Annex 2 of the Code calls on everyone concerned with fisheries to collaborate in implementation of the Code; urges that the special requirements of developing countries be taken into account in implementing the Code; requests the FAO to advise developing countries in this respect; calls upon the FAO to monitor and report on the implementation of the Code; urges the FAO to strengthen Regional Fisheries Bodies to deal more effectively with fisheries conservation and management issues.

On fisheries management the Code urges conservation and management measures based on the best scientific evidence available. Coastal states should co-operate in the management of transboundary, straddling or highly migratory fish stocks. Mechanisms should be set up for fishing monitoring, surveillance, control and enforcement. Excess fishing capacity should be prevented; fishing effort should be commensurate with sustainability. The precautionary approach should be a guiding principle for fishery management; the absence of scientific information should not be reason for inaction on conservation and management measures. States should regulate fishing in such a way as to avoid the risk of conflict among fishers. States should take measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species. The Code also suggests integration of fisheries into coastal area management. It urges an institutional framework, policy measures and regional co-operation to facilitate sustainable use of coastal resources.

The Code is one of the most important international instruments devised for wholesale management of the living aquatic resources of our planet. The effort that has gone into the Code is perhaps its main strength. It is all-inclusive and all-encompassing. It belongs to all of humanity. It is an indispensable source of reference on good conduct in fisheries.

The main weakness of the Code springs partly from its strength. The Code is elaborate and complex. Its language is dry and legal. It doesn't make for easy reading or comprehension.

To be meaningful, the Code must be not merely understood by all but implemented by all. The Code has to be translated into local languages. It needs to be simplified for various groups, particularly fishermen. Workshops and consultations are necessary, particularly at the grassroots level, to explain and discuss the provisions of the Code. The present National Workshop is one step in this direction.

As regards implementation of the Code, the Government of India has taken some landmark decisions in the recent past to implement the Code. To oversee implementation of the Code and other issues related with it, a National Level Committee has been set up under my chairmanship in the Ministry of Agriculture.

As we all are aware, marine fisheries in India – more so the coastal fisheries – have largely been an open-access fishery. Consequently no catch limits have been set on effort or the catch. To optimise the fishing fleet size, a National-Level Review Committee was constituted to study the size of the present marine fishing fleet in India *vis-à-vis* the harvestable potential and give recommendations on the effort that need to be deployed. The Committee has concluded, after discussion with experts and with coastal States, that the mechanizeed fishing fleet, in the size range of 8-15 m OAL, has attained optimum strength. But 700 new-generation resource-specific vessels, about 18m OAL, including trawlers and gillnetters-cum-longliners, could be added to the fleet to tap resources in the exclusive economic zone beyond the 50 m depth zone.

Presently, there are about 200 000 traditional craft in the country, of which about 35 000 are motorised. It is believed that this figure could be increased to 50 000. Motorization will ease the drudgery of traditional fishermen and enable them to go further out, reducing pressure on near-shore waters.

On the issue of resource conservation, a move to impose a uniform ban on fishing during monsoon months has been initiated. This ban will help reduce fishing pressure and stimulate rejuvenation of fish stocks. Most of the west coast States and Andhra Pradesh on the east coast have been enforcing bans on fishing during the monsoon period, although during different periods. I would urge all the coastal States to take an early decision on the uniformity of the ban after taking into account the best scientific evidence available with us.

The Government of India has set up an Expert Group to prepare a Comprehensive Policy for Marine Fisheries. The draft policy document is under finalisation and I believe the document has taken into account the requirements of the State towards implementation of the Code. Further, we have also constituted a Working Group of Experts to reassess the 1991 estimates of the potential yield of marine fishery resources, estimate the additional harvestable yield, and make suggestions about conservation of fishery stocks. The report of this Working Group is likely to be made available soon.

As regards popularisation of the Code and making it available in regional languages, the Tamil Nadu Fisheries Department with BOBP support has already translated the Code into Tamil. Street plays to popularise the Code have been organised in fishing villages. A video film has been made. More such that FAO should develop the concept of responsible fisheries and elaborate a Code of Conduct toward this end.

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Responsible Fisheries: Can it be Achieved with a Code of Conduct?

John Kurien*

The author divides India's fisheries history into three phases. Landmarks of these phases include modernization and bureaucratisation of fisheries, a big export push, a motorization drive for fishing vessels, the birth of joint ventures, and the strengthening of industrial shrimp aquaculture. Together these measures have hastened and aggravated the trend toward irresponsible fisheries. The author suggests an Indian code for responsible fishing, aquaculture and exports; greater awareness at all levels of the Code of Conduct; and better inter-State coordination in fisheries.

Introduction

When the era of freedom of the seas was about to end in the late 1980s, the FAO's annual State of Food and Agriculture made the following proclamation:

> *"The opportunity exists, as never before, for the rational exploitation of marine fisheries. Realization of the opportunity, however, will require major adjustments to the redistribution of benefits from the seas' wealth and improvements in the competence of the coastal states to exercise their newly acquired authority. The 1980s provide the threshold for a new era in the enjoyment of the oceans' wealth in fisheries."*

Twelve years later in 1992, the FAO made a review of the changes that had taken place in the decade following the above 1980 statement and the signing of the UNCLOS III in 1982. In this review, the optimism of the 1980s was replaced by careful introspection, in view of the fact that progress on all counts was slow. The Declaration of Cancun in 1992 best expressed the reality by stating:

> *"[May] the next ten years be declared the decade of responsible fishing, so that by the turn of the century, the rich opportunities afforded by fishery resources will begin to be realised."*

We have now reached this watershed. The two decades before the arrival of this new millenium saw a tide of international conventions, agreements and codes rising in the disturbed sea of global fisheries. These international instruments were negotiated with a distinct hope that opportunities to tap the

Mr N K Sinha delivers the keynote address at the CCRF Workshop in Chennai.

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wealth from the oceans and seas would expand to ensure the greater good of society as a whole.

At this juncture, two questions arise. Have we achieved a state of responsible fishing at the international, national or local levels? If not, is it due to a lack of conventions, agreements and codes?

As a social scientist, and also as an activist being involved in fisheries from the village to the global levels, my own answer to both these questions is a firm NO. There certainly have been many honest attempts at all levels to move towards responsible fishing. But we have a long way to go to reach our goal. However, lack of guidance in the form of conventions, agreements and codes is the least important of the reasons for not achieving our goals. Our non-performance is despite the availability of both legally binding and voluntary guides for action.

To talk about these issues of non-performance in the global context would be too general. Examining them at the local levels is too complex. Reflections at a national and sub-national level would be the most appropriate. The question before us today therefore is the following:

> **Why have we in India not been able to achieve "responsible fisheries" despite decades of our stated attempts to do so? Other than codes, conventions and agreements, what else is needed to achieve it?**

To answer these questions, it may be useful to first define what we mean by "responsible" fisheries. The Collins Westminster dictionary defines "responsible" with three words:

Accountable – being able to explain one's actions

Rational – being sane, equitable and fair

Trustworthy – being reliable and accurate

Achieving responsible fisheries is therefore an ART! Why have we not been able to achieve this ART of responsible fisheries? This warrants a brief and selective review of the evolution of our fishery history and its present status.

Phases of Fishery History in India

A brief review of the history and the present status of Indian fisheries will show that our concrete actions in the sector have been far from being accountable, rational and trustworthy. My focus here is on the marine sector. However, I do not think the inferences drawn are significantly different in inland fisheries or aquaculture.

I'll identify three phases in the movement – from the "initial" state of the fishery sector to its present "less than responsible" state of affairs. It is from this juncture that we wish to move towards responsible fisheries. I'll highlight the prime contradictions that arose in each phase and finally suggest some measures we may adopt to resolve them. Let us face it, fishery was never the hot favourite of development planners in our country. It still is not. But we need to remind ourselves that the future need not be so.

The First Phase

When he constituted the National Planning Committee (NPC) prior to independence, Pandit Jawaharlal Nehru (the first Prime Minister of independent India) wanted the problems and prospects of all sectors of the economy to be closely examined, and suggestions for a development strategy made. Consequently in 1945-46 a sub-committee did look into fisheries. It provided two perspectives that marked a turning point in the direction taken by the sector in the post-independence phase. The first perspective was the condemnation of the status of the existing industry expressed in the following manner by the General Secretary of the NPC:

> "Though the fishery resources have been exploited from time immemorial, they lack scientific utilisation and development. Certainly, in the case of coastal and still more, as regards deep-sea fishing, the occupation is largely of a primitive character, carried on by ignorant, unorganised and ill-equipped fishermen. Their techniques are rudimentary, the tackle elementary, the capital equipment slight and inefficient. (Shah, 1948:118)

The second perspective was a three-pronged state-led modernisation strategy :

(1) institutionalisation of the knowledge of fishery-related activities

(2) introduction of technologies being used in the developed maritime countries and

(3) creation of a fishery bureaucracy.

It is interesting to note that these perspectives aroused contrary opinions even at that time. The NPC Sub-Committee on Fisheries report contains the dissent note of one of its members, Dr. C.C.John. He was an eminent fishery scientist and fishery development adviser to the State of Travancore and Government of Ceylon. Dr. John was known for his pragmatic approach to introducing change in the fishing industry in Travancore. He stated his differences thus:

> "Though I fully agree that technological and biological researches are essential for providing technical and scientific advice to the fishing industry, I feel that the most fundamental need is the development of the industry itself on the basis of sound commercial principles with a view to eliminate waste, increase production and ensure proper distribution, *without overlooking the interests of those engaged in the industry and their urgent problems. (emphasis ours)"* (CC John in Shah, 1948:137)

The author criticises the neglect of the knowledge of traditional fishing communities.

About the imposition of new technologies such as the sporadic attempts to introduce the trawling techniques practiced in the North Atlantic regions, Dr. John was of the opinion that,

> "these experiments were not based on scientific data and were doomed to failure and proved nothing more than the futility and absolute wastefulness of blind imitation of foreign methods on the random suggestions of foreign experts who had no knowledge of Indian fisheries." (ibid:138).

Dr. John felt that the yardstick of success and responsibility for an industrial department like fisheries was,

> "not merely the number of new fishes which they have christened or the number and bulk of reports produced but by the extent of their usefulness to the industry in terms of new ideas or suggestions calculated to promote efficiency and expand scope and possibilities." (ibid: 138)

In my understanding this was the starting point of our movement away from "responsible" fisheries. That momentous decision to totally ignore what was the backbone of the fishing activity in the country and replace it with a new state-sponsored scientific, technological and bureaucratic framework was hardly an accountable, rational or trustworthy action. We are still paying for this today.

First, the neglect of the rich diversity of knowledge, technology, and institutions (rules and norms) of our numerous traditional, small-scale fishing communities scattered around the coastline of the country, is at the root of their continued economic plight. Fishing communities continue to be marginalised in most maritime States including Kerala, a State that has been heralded the world over for the success of its overall social development. If fishing communities in the maritime States are restive and belligerent today, the root cause is to be found in the historic blunder of moving to build a "modern fishery" *without basing* it on the strengths of what existed in the "traditional fishery" of that time.

Secondly, the dominant role given to the state for setting the research agenda, deciding on the choice of technology and setting out the administrative framework for disseminating it had a negative side to it. It curbed most avenues for initiative from other players in fisheries. One important result of this, which has been rarely highlighted, is the *de facto* change in the institutional ownership arrangement *vis-à-vis* the fishing communities and the fishery resources that they had harvested from time immemorial. Most fishing communities had a clear conception of their "community rights and duties" with regard to the resource. None of this was of course in the form of any title deeds or written claims. The mere fact that for centuries, other people in society accepted the fishing communities' implicit ownership stakes, was sufficient proof of the latter's property right claims.

The state rode roughshod over these historical rights. What was once a mosaic of community property rights was first declared as state property. Thereafter it was relegated to the realm of "open access." In open access, there are no property rights – only *possession rights.* Anyone can have access to the resource as a matter of right. Today's overfishing problem and excess capacity problems, even in the small-scale fishery, have their roots in this transition. In hindsight, this was certainly an action of the state that fostered and promoted irresponsible fishing.

The Second Phase

The next stage in the movement away from responsible fishing came with the larger national economic crisis of the early 1960s. This can be traced back to two important happenings in Kerala State in the 1950s. The first pertains to the export of frozen shrimp to USA by a private entrepreneur and the second was the successful introduction of small trawlers by the Indo-Norwegian Project. These two initiatives in tandem highlighted the fisheries sector's ability to generate quick foreign exchange earnings. It brought the marine fishery, hitherto a state subject, into sharp focus at the level of the Central Government. The forced devaluation of the rupee in 1966 was another watershed in the policy directions taken for the fisheries sector. The great push for exports resulted in the larger allocation of plan funds for fisheries as well as the promotion of private initiatives into adopting bottom trawling for shrimp and freezing them for exports to the US and Japan. This period saw a big rush of "outside capital" into the hitherto "caste occupation" of fishing. With the huge amounts of money that could be made, it suddenly became socially respectable to say that you were in the fish export business!

Equally important in this phase was the direct entry of the state into the fish economy in a big way. The Central Government took on the onus of making huge infrastructure investments in the form of major harbours and landing centres. Many State governments set up wholly owned fishery corporations to get involved directly in fishing, export processing and ancillary activities. Fisheries development in India, and particularly in the maritime states, became synonymous with the "pink gold rush." The state and unbridled market forces were very much in control. The fishworkers and the fishing community were largely out or remained at the periphery.

Many conflicts occurred between trawlers and traditional fishing craft during the second phase of India's fishing history.

This phase, which lasted until the end of the Sixth Five-Year Plan in 1985, was also the period when the fishery sector in most of the southern States (Goa, Karnataka, Kerala, Tamil Nadu and Andhra Pradesh) experienced sharp internal social conflicts. There were battles at sea between fishermen on trawlers and those operating artisanal fishing crafts. It became a case of one sea and many contenders. Result: some stark contrasts. On the one hand the amassing of wealth by a few (the recent entrants into fishing, particularly those who only made capital investments) and on the other, the impoverishment of traditional fishers. This was also the period when the social and political mobilisation of the fishworkers was most widespread. The formation at the national level of the independent National Fishworkers' Forum and several State-level political party affiliated fishworker trade unions were also a salient feature of this phase.

The marine shrimp harvest in the country increased from 70,000 tonnes in the period 1966-70 and stagnated around 113,000 tonnes in 1981-85. Shrimp exports during the same period rose from 15,000 tonnes and stagnated around 53,000 tonnes. Earnings from shrimp exports, due to the steady increase in the international prices of shrimp, rose from Rs 176 million in 1966-70 (accounting for 51 per cent of the total value of all marine products exported) to Rs 3003 million in 1981-85 (accounting for 86 per cent of the total value of all marine products exported).

Another major realm of contention during this phase related to the appropriateness of the bottom trawling nets used to harvest shrimp in a tropical fishery ecosystem. There was evidence to show that the composition of the shrimp catch over the years, particularly in Kerala State, moved towards the smaller, less market-valued species. Consequently, though the quantity exported may have increased, one major question still remains unscrutinised. If the catch composition of the mid-1980s (species-mix harvested using bottom trawls on a perennial basis) remained the same as that which we had in the early 1970s (species-mix harvested using passive gear on a seasonal basis) would India have earned more foreign exchange at lower capital and recurring costs? An examination of the data of Kerala and the whole of the southwest coast provides a positive answer to this question. Surely this is not an accountable action or sound economics!

In this period fisheries development could by no means be equated to fishworkers' development. Also, fisheries development did not yield the optimum economic benefits. These were by no stretch of imagination rational consequences.

The Third Phase

The period after 1985, until the end of the century, can be considered as the third phase in the movement towards increasingly ART-less fishing. This phase is also co-terminus with the post-liberalisation of the Indian economy which began gradually in the early 1980s and speeded up in the early 1990s. Three major new features can be identified during this phase.

- Firstly, following a liberalised import regime, there was a marked increase in the motorisation of artisanal fishing crafts by using outboard and inboard motors. This was combined with the successful introduction of small beach-landing boats made of new materials like marine plywood and fiberglass. This was a widespread phenomenon along the whole coastline of the country. Some maritime states encouraged this trend more than others.
- Secondly, under external and internal pressure, the Central Government permitted many new joint venture agreements for fishing in the Indian EEZ outside the 12 nautical mile territorial waters.
- Thirdly, there was the thrust to encourage industrial shrimp aquaculture in the coastal areas presumably to compensate for the stagnation in the marine shrimp harvest (mentioned above).

The most significant feature of this phase was a withdrawal of the state from making new financial commitments to the sector. Also, many regulatory regimes that once provided a frame of reference to the direction of development in the sector were grossly diluted in the name of national economic liberalisation and commitment to the global community. The focus of this period was on a greater role for the market that was actively aided, directly and indirectly, by this withdrawal of the state and its agencies.

There was a very unfortunate dimension to this *laissez-faire* (non-interference) approach by the state. In all the three features mentioned above, this withdrawal resulted in anarchy of sorts. It resulted in free play for all and sundry. Unfortunately, the playing field was not level and there was no referee for the game.

- The motorisation and new craft designs of the artisanal, small-scale fishworkers led to severe overcapitalisation and excessive use of fossil-fuel energy. We are spending more and more to catch less and less fish per unit of effort. Kerala state provided the classic example.
- The joint venture initiatives led to many unwise collaborations and would have resulted in a virtual sell-out of our fishery resources were it not for the united opposition to this policy from all the existing sub-sectors in the fish economy. This forced the government to retreat. Most of the foreign investors seem to have developed cold feet in the murky waters.
- The export-led aquaculture "boom" was also short-lived. A combination of disease (caused by reciprocal externalities of the aquaculture units themselves) and protest from civil society to the uni-directional negative externalities of the activity, hastened its "bust."

In all the above we see the failure of both the market and the state – particularly when the two are totally divorced from each other. The state totally abdicated its role as a regulator and coordinator of economic activity and was thus unable to ensure the larger interest of the society. The mindless encouragement of the logic of the market for short-run gains also alienated fishery-related activities from the moorings of the larger community ethos in which it could have been situated.

Some Pre-conditions for Responsible Fisheries

This brief narrative of the three phases of fisheries development in India leads me to conclude that if the Code of Conduct for Responsible Fisheries (CCRF) is to become an effective instrument in guiding Indian fisheries into an accountable, rational and trustworthy future, certain pre-conditions must be met. I shall enumerate below three of the most basic among them. They may serve as the foundational building blocks for sustainable fisheries development and management into the future.

First, a clear definition of the nature of property rights to the resource should be spelt out. Who should be given access rights to the sea? Should these rights be assigned based on both socio-economic and techno-spatial criteria?

Secondly, the quantum of harvest of the fishery resource and the technology used for it should match the given bio-ecological realities of our aquatic terrain. Should our focus be on seasonal targeting of specific species or on merely maximising the total volume of output? Can we blend time-tested craft and gear designs with new fabrication materials to obtain a proper mix of value and volume of output from the sea?

Thirdly, the roles of community, market and state in fisheries must be clearly delineated. Only such mutual interactions will increase the trust between actors in the different realms. Should the process be left to evolve with time or can institutional arrangements be crafted by a conscious exercise of the actors concerned?

In a way, these three pre-conditions reflect the important primary contradictions that surfaced during the three phases of fisheries history that were enumerated above. My contention is that Indian fisheries moved from one phase to the next without resolving these contradictions. Consequently, the problems have compounded themselves. As we enter the new millennium in Indian fisheries, we are confronted with a situation where we need to take steps to fulfill these pre-conditions contemporaneously if we are to move into a phase where

All stakeholders must take active part in the fishery, says the author.

accountability, rationality and trustworthiness are the key organising principles of the fishery. Codes and conventions become effective guidelines only if the above pre-conditions – which are largely socio-political in nature – can be met.

Moving towards Responsible Fisheries

The first step to moving towards responsible fisheries is to recognise these pre-conditions as part of an explicit government fishery policy. On this score, one hopes that the Government of India's recently constituted Expert Committee for the Formulation of Fishery Policy will take account of these issues and reflect upon them carefully.

The role of the state is paramount in giving ***direction*** to the steps that the sector will take and NOT in deciding the ***pace*** at which it will move. The latter will require the participation of all the stakeholders in the fishery. It is essentially a collaborative initiative that has to be undertaken by all those involved in the fishery sector. The CCRF attains its special relevance in this context. Unlike other international instruments it is addressed to all.

To my mind the CCRF can become the rallying point around which we can get every category of stakeholder involved in fisheries to discuss both the pre-conditions for responsible fisheries and the direction and the pace at which we should move forward. In our country, the special emphasis that must be given to the small-scale fishery is also adequately addressed in the CCRF.

The first step for ensuring this all-round participation will be to initiate a process to ensure that awareness about the CCRF spreads concurrently at all levels: politicians, policy-makers, bureaucrats, scientists, entrepreneurs, fishworkers and others such as environmentalists with a demonstrated interest in fisheries. To achieve this, there has to be a conscious and committed process of making all stakeholders aware of the CCRF and its contents. A concerted Plan of Action that makes it possible to create awareness **simultaneously** from above and below must be initiated. It is gratifying that the FAO/BOBP is setting a good example in this direction. The main focus should be the maritime states. The Departments of Fisheries should initiate measures to translate the CCRF into their respective state languages. This has been done in Tamil Nadu with the assistance of the BOBP. In Maharashtra, the National

The Code of Conduct urges special emphasis on the small-scale fishery.

Fishworkers Forum translated a lengthy annotated summary of the CCRF into Marathi. Simplified and illustrated versions providing the essence of the CCRF should be distributed at the coastal panchayat level. Fishery Department Extension Services in all the maritime states should mobilise a variety of communication aids to get the message of the CCRF across in the fishing villages.

Agencies like the Marine Products Export Development Authority (MPEDA) have a major role to play. The MPEDA is the only agency with a legally mandated role for management (though technically only for the offshore and deep-sea) and the funds to finance such initiatives. The MPEDA should take the initiative to ensure that all fishing vessels, aquaculture units and exporting firms registered with it are made aware of the implications of the CCRF and in particular, Articles 7, 8, 9, 10 and 11 relevant to their activities. Technical and financial assistance should be offered to make the changes necessary in their operations to meet CCRF requirements.

At the level of national governance of fisheries, there is need for much greater inter-state collaboration. This is particularly crucial if we are to move towards a sustainable management of our marine resources. It was recently suggested at a multi-stakeholder workshop in Gujarat that fisheries should move to the concurrent list in our Constitutional schedules. Even if this takes time, it is paramount that we have more inter-state fishery coordination councils to deal with the issues of resource sharing, harvesting and marketing. Issues pertaining to inter-state movement of fishworkers in the harvesting and processing sectors also merit greater collaboration by state fishery and labour departments. To facilitate such collaborative action in the future, agencies like the BOBP, in collaboration with the Government of India, should organise common training programmes for the state fishery department officials.

At the fishing village level a far greater role needs to be played by panchayat raj institutions. The initiatives of the Government of Kerala in this regard are worthy of emulation by other states. A far-reaching legal measure on this account would be for maritime states to give coastal panchayats effective control over the landward coastal regulation zone and the seaward littoral regulation zone.

The formulation of an Indian Code for Responsible and Safe Fishing, Aquaculture and Exports (ICORSAFE) should be given priority. It should be a combined effort of the Government of India, the state governments, the MPEDA, the various boat owners' associations, fishermen trade unions, shrimp farmers and seafood exporters' associations and representatives of the workers in these units. This effort should have the backing of the numerous Indian fisheries research bodies. Such an initiative will go a long way to create consumer confidence in Indian marine export products. This is a measure long overdue if we are to increase our share of the world market. This can also be a first step towards evolving a national eco-label on our terms rather than have standards dictated to us by First World multinationals and environmentalists.

The transition process to responsible fisheries is unlikely to be smooth and painless. There is a mistaken notion that responsible fisheries can be achieved if we merely adjust the rates of harvest to the rates of resource rejuvenation. In other words a mere technological fix. What we need to constantly bear in mind is that the transition is fundamentally a socio-political one. There will be winners and losers and therefore resistance to this change. Consequently, any transitional plans intended to meet any of the pre-conditions and measures mentioned above need to be handled with care and caution. A recently constituted independent global commission on fisheries resources (WHAT, 2000) examines this issue at the global level. Much of what is said in that report is applicable to the national level as well.

Conclusion

The millennium ahead calls for some radical changes in the manner in which we have been doing things so far in our fishery sector. This calls for a fresh commitment on the part of all the stakeholders in the sector. Over the decades we have overloaded our boat with a variety of cargo. Added to this, we have also often placed the cargo aboard in a haphazard manner, making our craft unstable and unsafe. The priority is to shed a lot of the dead weight, take on some new cargo and reorganise the lot on the deck in balanced fashion. Then we can reset the rudder to take a new course towards accountable, rational and trustworthy fisheries development and management with the codes and conventions as our navigational aids.

Applying the Code of Conduct for Responsible Fisheries to Small-Scale Fisheries in India*

Sebastian Mathew

International Collective in Support of Fish Workers

Implementing the Code of Conduct requires legislative reform so that the emphasis in Indian fisheries switches from exploration and exploitation toward conservation and management. The latter requires a spirit of 'ownership' amongst principal stakeholders, through a consultative process among the Union and State Governments, the fishing industry and fishing communities. Reliable information is essential as well.

Introduction

An Internet search of the term "Code of Conduct" yields hundreds of references. Most of them relate to activities on a moral plane - to conduct in the areas of education, public life, sports, humanitarian assistance, the arms trade. A code of conduct attempts to bring ethics into a professional act. A person or group that subscribes to a Code agrees to practise a profession according to the principles and standards that are laid down in it.

A code of conduct is thus a standard-setting exercise with ethical connotations. But fishing is an act based on taking aquarian life. How appropriate is a Code with moral and ethical connotations for setting standards for such an activity? In this sense, there may not be any parallel to the Code of Conduct for Responsible Fisheries.

The Fisheries Code

The Code of Conduct for Responsible Fisheries (henceforth, the Code) was the second example of FAO taking part in developing a Code (FAO 1995a). This is a voluntary, standard-setting code; its main objective is to establish principles and standards of behaviour for responsible fishing and fisheries practices after taking into account relevant biological, technological, economic, social, environmental and commercial aspects. It was developed through a consultative process involving States, representatives of the industry and NGOs.

Although the focus of the Code is mainly on fishing operations, especially aspects relating to fishing in the high seas, the scope of the Code includes capture, processing and trade of fish and fish products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area. It includes, in other words, all aspects of fisheries -- from the fishing ground to the final consumer.

Problems and Prospects in Applying the Code

Adopting the Code is one thing; applying it to fisheries is indeed an onerous task. States may reveal the best of intentions during the negotiations for producing a non-binding legal instrument like the Code. But intentions do not necessarily lead to action for several reasons. Even legally binding instruments like the UNCLOS are yet to be fully implemented.

So far, rich coastal States like the United States, Canada and Australia have taken major steps to implement or apply the Code. In the United States the initiative has come from the State, and in Canada and Australia, from the industry. The U.S. has prepared an implementation plan for the Code that addresses key elements of sustainable marine fisheries. While the Australian Code applies to aspects of the seafood industry like production, processing, and marketing, that of Canada applies only to fishing operations that will contribute to sustainability in marine and freshwater fisheries.

It is five years since the Code has been adopted. So far we have not heard of any developing country taking concrete steps to apply the Code to its marine fisheries, let alone its industry. On the contrary, we hear of the Southeast Asian Fisheries Development Center (SEAFDEC) expressing some concern about the Code being "more relevant to the developed countries". SEAFDEC is in the process of producing an Asian Code for coastal fisheries.

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Conservation and management do make better business sense when a country seeks to access international markets. The recent debates around eco-labelling are sufficient proof of this. As resources come under increasing pressure, the market for eco-labelled fish is bound to expand. Those countries that are in the forefront with better conservation and management regimes are bound to benefit from better marketing opportunities. Consumers of fish and fish products in rich countries are likely to express a greater preference for fish produced under better conservation and management regimes. The origin of eco-labelling schemes like the Marine Stewardship Council is based on these expectations.

There is a tremendous opportunity for developing countries to adopt conservation and management measures – since it is they who produce most of the fish preferred by the rich countries. The latter will pay a higher price for fish that are responsibly produced. This calls for a proactive engagement with fisheries conservation and management issues both by the State and the industry. To set national product and process standards to access lucrative markets, developing countries would need co-ordinated action, especially implementation of principles and standards that the global community would approve of. Applying the Code should also be seen from this perspective.

Adapting the Code to India's Small-Scale Fisheries

1. Dynamism of the small-scale sector

In the past, small-scale fisheries most often meant non-mechanised fishing units, irrespective of size and quantum/kind of gear. The polarisation of Indian marine fisheries into mechanised and non-mechanised, which prevailed until the early 1980s, has since broken down. With the advent of affordable new technology and the introduction of new materials for construction of boats and gear, the traditional/artisanal/small-scale fisheries are going through unprecedented changes. For example, the investment in a "traditional" pelagic fishing unit using purse seines now exceeds that of a 12 meter (m) bottom trawler. The advent of outboard motors (OBM), the use of fibreglass reinforced plastic (FRP) and plywood boats, the use of global positioning system (GPS) and even cell phones, are significantly redrawing the fisheries profile of the small-scale sector in India and contributing to a growing differentiation within the sub-sector.

The small-scale sub-sector is much more diversified than before. It is difficult to recognise it as a homogenous category any more even in terms of propulsion techniques. Under current circumstances in India, one would tend to argue that most, if not all, fishing vessels that operate within the territorial waters would qualify as 'small-scale'. This would include all fishing methods employed by these vessels including trawling, purse-seining, gill-netting and long-lining and any other forms of fishing. The nuances that one may associate with 'small-scale fisheries' may vary from state to state.

Organisations of small-scale fishermen are even getting into trade arrangements with countries in the European Union. The South Indian Federation of Fishermen Societies (SIFFS), for example, is negotiating the terms of entry into the German Fair Trade market through its biggest super market chain, *Deutsche Sea*. There also seems to be significant improvement in fish handling practices with iced fish travelling great distances to reach markets offering the best prices. The quantity of fish travelling the length and breadth of the country also seems to have increased tremendously. The 'revolutionary' implications of these dynamic changes in production, processing and marketing remain largely unexplored even today.

2. Worrying signs of overfishing

According to the *Handbook on Fisheries Statistics* 1996, fish has been the fastest growing item in the food sector in India since 1950-51 – after eggs, chicken and potatoes – thanks to the phenomenal growth of small-scale fisheries in India. The largest share of marine fish production now comes from the mechanised sector using inboard or outboard engines in the territorial waters under the jurisdiction of maritime States.

This increase in fish production in response to market demand from within and outside the country has come at a price. It has led to anarchic growth of fisheries, with too many boats chasing a resource with a shrinking base. Coastal fishing vessels registered with various maritime States are moving into waters beyond the territorial sea, also from the waters of one maritime State to another – all signs of an exhausted home fishing ground and excessive fishing capacity. Gujarat trawlers, for example, fish beyond the territorial sea and also in the waters of Maharashtra. The longline fishermen of southern Tamil Nadu fish for shark all over the country. The teppa fishermen of northern Tamil Nadu, using gill-nets, fish in the waters of Andhra Pradesh. The plywood boat fishermen of Kerala using purse-seines fish in Karnataka and Goa. Trawlers from Kakinada, Andhra Pradesh, catch shrimp in Orissa and West Bengal.

The Central Marine Fisheries Research Institute (CMFRI) has observed that the potential of the current fishing grounds in India has already been crossed. The FAO Fisheries Country Profile of India talks about how "India's marine fisheries production has reached a plateau…"

Gujarat, which is in the forefront of market-led development, and is currently the biggest producer of fish in India, now faces a major crisis in its marine fisheries, with economic and biological overfishing. After a phenomenal and almost unbroken run, the marine fish production in absolute terms suddenly dropped by over 27 per cent to 552,000 tonnes in 1998-99, from a peak of 702,000 tonnes in 1997-98.

Clearly, the stage is now set for conservation and management. Given sufficient will and imagination, it can be achieved.

3. Conservation and management: problems with current fisheries legislation at the national level

The Code cannot be applied to national fisheries in a legal vacuum. Framework legislation is essential for that purpose. There should also be a sense of collective responsibility among the provincial and the central governments, and coordination between them.

The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976 of India, for example, recognises {through Section 7 Para (4) (a)} the sovereign right to conservation and management of living resources in the Indian EEZ in addition to their exploration and exploitation. Section 15 (c) gives further power to the Central Government to make rules, *inter alia,* for conservation and management of the living resources of the EEZ and Section 15 (e) for the protection of the marine environment. The basic fisheries legislation that followed this Act, viz., the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 and the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Rules, 1982, however, do not make any mention of conservation and management and it is high time that legislation was amended to bring in these measures.

The only Indian legislation that talks about "undertaking measures for the conservation and management of offshore and deep-sea fisheries", is the Marine Products Export Development Authority Act, 1972 [Section 9(2)(a)]. The Act, however, does not define what it means by 'conservation and management'. It also has a provision by which the costs of conservation and management of waters beyond the territorial sea are met by the Marine Products Export Development Fund [Section 17.2 (c)]. However, MPEDA has never invoked this legal provision.

4. Conservation and management: problems with current fisheries legislation at the State level

The above legal instruments apply only to the EEZ, which is the marine area beyond and adjacent to the territorial waters and which contributes only negligibly to the total marine fish production of India (about 0.01 per cent!). According to the Seventh Schedule, Article 246 of the Constitution of India, fisheries within the territorial waters of India are under the jurisdiction of the State Government. The pressures of overfishing are felt most acutely within these waters. Reform of the State-level conservation and management regime is therefore urgent.

Small-scale fisheries has become much more diversified than before, says the author.

As far as the State Governments are concerned, the most significant drawback in the legal system for marine fisheries is that, in spite of the resources being overfished, they are yet to introduce conservation and management measures. Nor is there any legal mechanism to address inter-State movement of fishing vessels. The main emphasis of the Marine Fishing Regulation Act of the maritime States of India (except for Gujarat, which is yet to have a legal instrument for its marine fisheries) is on regulating fishing vessels in their respective 12-mile territorial sea, mainly to protect the interests of fishermen on board traditional fishing vessels.

The Act was based on a model bill prepared by the Ministry of Agriculture, Government of India, more than two decades ago. The Act has been primarily used to separate trawlers from other gear groups. In this sense, the Act has mainly served to maintain law and order at sea rather than to promote fisheries management. In the light of developments in the traditional sector over the past 15 years, this Act looks very outdated today and urgently needs amendment.

5. Conservation and management: need for compatible legislative regimes at the national and State levels

In general, Indian fisheries legislation seems to target the fishing vessel rather than the fishery per se. This is true of the Merchant Shipping Act 1958, MPEDA Act 1972, the Maritime Zone of India (Regulation of Fishing by Foreign Vessels) Act 1981 and Rules 1982 as well as the Marine Fishing Regulation Acts of the Maritime States. What seems to be essentially regulated is access to fishery resources in time and space. Technical specifications for the fishery are sometimes prescribed but they do not seem to be followed up in strict implementation.

The need for conservation and management of marine fisheries should be seen in proactive terms, consistent with United Nations Convention on the Law of the Sea (UNCLOS) and the other international legal instruments that India has acceded to. They should refer to all of the rules, regulations, conditions, methods, and other measures, which are required to rebuild, restore, or maintain any fishery resource and the marine environment. It is also important that conservation and management are made the collective responsibility of the Union and the State Governments.

The emphasis has to be on the fishery rather than on the fishing vessel. The above focus would help us look at the impact of a particular fishery on associated and dependent species of the target stocks. It would enable us to address issues of social dimension within the scope of fisheries management. It would also allow for bringing into the scope of conservation and management, not only the supply side of fisheries, but also the demand side.

"Since India has a large coastal population, labour-intensive gears and techniques must be promoted within a sustainable rights-based regime."

It is high time the Ministry of Agriculture at the Centre drafts and circulates a model fisheries conservation and management bill amongst the littoral States and Union Territories.

The dynamism of Indian small-scale fisheries also clearly highlights the need for greater co-ordination between States and between States and the Union Government. Marine fisheries ought to move from the State and Union List respectively into the Concurrent List. This could facilitate coordination between the maritime States of India and the Union Government to work in conservation and management. It could also mean setting up, as in several other countries, a co-ordinating body for the fisheries resources of the country with representatives of all stakeholders.

Conservation and management of fisheries resources should, needless to say, go hand in hand with protection of the fish habitat. Measures are needed to protect the marine environment from pollution. The Water (Prevention and Control of Pollution) Act, 1974 has provisions to protect the coastal sea from land-based sources of pollution but subject to the discretion of the State Government.

6. Adapting the code: the need to engender 'ownership'

(a) *Engendering 'ownership' among State Departments of Fisheries*

The Ministry of Agriculture is the nodal agency for FAO and represents India in all FAO projects and processes. This includes the process that led to the development of the Code. State Governments, which have greater jurisdiction over fisheries within the territorial waters, haven't participated in the process. This is because the Constitution assigns to the Union Government the responsibility for participation in international conferences and implementation of treaties, agreements and conventions. State Governments can participate in such processes only if they are part of the national delegation. It may not therefore be easy to foster 'ownership' of the Code amongst State governments. But this problem can be overcome by initiating a process for development of a national Code in which all maritime State governments and other stakeholders participate.

If State Governments develop a sense of 'ownership' of the Code, it should then percolate to the fish producer, processor and trader/exporter and the fishing community. Historically, India has a prescriptive move-down tradition. What is most significant is a consultative approach with all stakeholders to build up this sense of ownership at the grassroots.

(b) *Engendering 'ownership' in the fishing industry*

A sense of ownership amongst the practitioners of marine fisheries could be better engendered if the State fisheries departments and the Union Ministry of Agriculture publicly defend the interests of the sector. But fisheries departments in India seldom take any position on the importance of protecting coastal habitats – which are very significant for the regeneration of fish, especially when they are young. The quantity and quality of nutrient-laden freshwater discharged into the coastal areas are quite significant for regeneration of fish. In various debates on dams, when engineers lament the "wastage" of water that is drained out to the sea, no fisheries department has ever cared to point out that this discharge helps maintain the appropriate salinity regime for the regeneration of fish, which are a crucial source in India of livelihood, jobs and foreign exchange.

It is the duty of the State fisheries departments and the Union Agricultural Ministry to defend the interests of the fisheries sector and ensure sufficient recognition for it. A degraded coastal habitat will certainly impinge on jobs and livelihood in the fishing industry. In Japan, property rights are given to fishing communities; if any firm wants to set up a unit in the coastal area, it has to negotiate with the community and buy rights.

(c) *Engendering 'ownership' amongst fishing communities*

So long as open-access regimes remain, fishers have no incentive to be interested in management. This is linked to the issue of 'ownership'. Unless recognised rights are granted to fisher communities, they will not act responsibly towards the resource. We should move towards rights-based fisheries, which are equitable and conservation-oriented in nature. Since India has a large coastal population, sustainable and labour-intensive gears and techniques should be promoted within a rights-based regime.

The entire text of the Code makes only three references to the notion of 'access' to fishery resources in waters under national jurisdiction. All these are in the context of small-scale fisheries or coastal fishing communities. The most important reference is under Article 6 on General Principles (para. 18).

6.18 Recognizing the important contributions of artisanal and small- scale fisheries to employment, income and food security, States should appropriately protect the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction.

The second reference in the Code to access is in the context of aquaculture development. Article 9.1.4 talks about the need to protect the access of local communities to fishing grounds while developing aquaculture. The third reference is under the Article on Integration of Fisheries into Coastal Area Management, where States are asked to take into account the rights of coastal fishing communities while determining access to coastal resources.

The 'preferential access to small-scale fishers' theme is embodied in Christy's notion of creating territorial use rights in fisheries or TURFs, as they are popularly called (Christy 1982). Within this framework, Kurien proposes the need for aquarian reform to bring in the notion of equity in a labour-intensive fishery, especially in a labour-intensive, tropical context. These are

(i) to restrict the right to fishing assets for use in coastal waters, exclusively to those who fish and

(ii) to have a ceiling on the number as well as the scale of fishing assets. Specific measures could include a ceiling on the number of boats that could be actually owned by one individual or family.

Limited access regimes are the fence within which responsible fisheries can be institutionalised. The basic fisheries legislation should, therefore, allow for these access rights to be defined and legitimised in a consultative manner. They should also devolve down to the panchayat level. (Article 6.1 of the Code). Rather than reinvent the wheel, what is required is the creative adaptation of existing arrangements, which are generally strong on distribution but weak on conservation and management. They are also more cost-effective and would therefore be of greater relevance to countries like India .

(d) Addressing Information Gaps

Information that will help sound fisheries planning is essential. Better tools to collect information are also necessary. To cite a few examples: we do not yet know how reliable our stock assessment estimates are since they are based on a model developed for the temperate ecosystem. We have no idea about the impact of fisheries on associated and dependent stocks. We have no way to find out the relative impact of fishery-dependent and natural factors on our fish stocks. Is it El Nino or is it excessive fishing pressure that is responsible for decrease in production of some of our pelagic species? How much do we know about the impact of habitat- degrading activities like pollution, reclamation, mangrove deforestation, and dams on the biological productivity of fisheries resources? What is our understanding of the marine and coastal ecosystem?

The reliability and comparability of our fisheries data needs to be improved and raised to international standards. We have no reliable information except for our export statistics. The categories 'full-time', 'part time' and 'occasional' fisherfolk used by the Ministry of Agriculture seem to serve only a limited purpose in planning for fisheries management and development. We have no real data on women, men and children gainfully employed in fisheries-related activities. Terms have to be

Advocates of aquarian reform say that the right to acquire fishing assets for use in coastal waters should be conferred only on those who fish.

More reliable data and better data collection tools are needed in fisheries.

standardised. To describe fish stocks, for example, several terms like 'standing fishable stock', 'marine fishable stock', 'maximum sustainable yield', 'total potentiality' and 'total potential yield' are interchangeably used.

We have no clear picture of the level of investment in our fisheries, either aggregate or by sub-sector. Although we have a rough idea of the quantity of fish that is produced, we do not have a clear understanding of the total value of fish that is being produced and marketed within the country. We have no idea about trans-border trade of fish within India. We have no reliable information on fishing capacity by number of fishing units and their fishing power, including the specifications of craft, gear and engine.

We have no clear understanding about the extent of migration into fisheries from other sectors and vice versa. The system for collecting basic statistics also seems to be quite inadequate. There are conflicting figures on fish production. Take the fish production statistics of Gujarat compiled by the State Government and CMFRI. There is considerable divergence between the two sets of figures. The functions of some of the national agencies also seem to overlap.

The absence of proper co-ordination and lack of incentives seem to prevent the large number of marine research centres – one of the highest amongst developing countries in the world – from bringing out quality information in a timely and complementary fashion. These centres employ some of the most well qualified personnel in fisheries in the country, especially biologists. The links between India's research centres and the industry are also weak – unlike in China.

Coming to terms with this shocking lack of information is perhaps the first step towards responsible fisheries. Marine fisheries are a significant sector from the standpoint of employment, income, foreign exchange and national security. The economic profile of this sector demands generation of more diversified, reliable and accessible information towards a common set of objectives and goals. This would call for developing a national marine fisheries policy through a truly consultative process.

Conclusions

Over and above political considerations, the countries that have adopted the Code are the ones that have reliable information about their fishery resources and fishing fleets. In India, we still base our understanding of fisheries on surmises or outdated pieces of information. Moving towards a knowledge-based system for fisheries management and development is the first step towards applying the Code, whether or not we talk about large-scale or small-scale fisheries. And while deciding to apply the Code, we should avoid a compartmentalised approach. Selective application of the Code to a particular group of fisheries may prove to be counter-productive.

What we need is a holistic perspective and a mechanism to arrive at collective responsibility, compatible between different user groups. This also raises questions about political will. In a country where fisheries contributes only a little over one per cent of the GDP (at current prices) and 3% of export earnings, it may be difficult to generate the political will to undertake all the changes proposed. A concerted effort in this direction certainly needs to be made.

Once the central goal of conservation and management and the role of a consultative mechanism to achieve this goal are recognised, and once the importance of limited access regimes is accepted in principle, marine fisheries could move towards responsible fisheries, based on the principles and standards of the Code. Almost the entire fish production of India comes from the small-scale sector. Adapting the code to small-scale fisheries is tantamount to adapting the Code to Indian fisheries.

One of the important peacetime tasks of the United Nations and its agencies is to help set priorities and standards. In a world where member-nations and peoples are too preoccupied with a multitude of issues, the UN draws the attention of the global community to issues that may have a bearing on our future.

More than standard-setting, one would argue that the greater relevance of the Code is in making us think about the state of our fisheries resources and in putting some pressure on us to set our priorities right. When we read the Code and look at Indian fisheries it shocks us. Can the Code help us set down our main priority as conservation and management? Could we then prime up our fisheries to make it more responsible within a reasonable time frame?

To revamp a mind-set oriented to development through production and marketing, and change it to one that focuses on development through conservation, management, habitat protection and value addition, requires a radical change in our thinking. It calls for a multi-dimensional perspective, a 'cubist' approach to fisheries management and development issues.

Operationalising the Code

Kee-Chai CHONG

How can the Code of Conduct for Responsible Fisheries be operationalised? How best can it be translated into action? A checklist of guidelines was presented and discussed at the Chennai workshop by BOBP's former director, presently a consultant to SEAFDEC – which is preparing a regional version of the Code of Conduct for Asia.

The checklist that follows is meant to facilitate discussion on the preparation of guidelines to the Code of Conduct for Responsible Fisheries. First, some basic points:

- Fisheries Management often means *Un-doing Less Responsible Practices of the Past.* It does not necessarily mean new ways of doing old things. It entails *More Responsible Practices to Harvest Fish to Ensure Conservation and Sustainability.* These practices should promote greater and wider adoption at the local level.
- The guidelines being prepared by the SEAFDEC Core Group of Experts are different from the ***globalised*** technical guidelines prepared by FAO. The SEAFDEC guidelines use inputs from your country and your fishers. Likewise the Guidelines you must formulate should reflect your own views, your country's views and needs.
- We need to banish the myth that fisheries management is carried out only at sea when the fishers are in action, and that it requires large numbers of patrol boats and enforcement staff. Fisheries management activities can be wholly shore-based; they may be carried out on land – before the fishers leave the fishing port to fish, or after they return from fishing. Of course, patrolling at sea (when the government can afford it) strengthens further compliance of fisheries management measures.
- *Constraints to Implementation:* We must specially tackle constraints that inhibit implementation at the local, national and regional levels.
- *Orientation of Guidelines:* Who are the guidelines prepared for? For whom and at what level? Responsible behaviour is not automatic: people do not automatically do the right things, like forming a queue, unless instructed to do so. How can the guidelines proposed be

"Fisheries management activities can be wholly shore-based."

institutionalised, made a part of regular practice? Note that the guidelines promote the opposite of what shouldn't be done. They induce change from bad practice to good, from what's wrong to what's correct.

- *We should find ways to get fishers and other stakeholders* ***more involved*** *and to take* ***more responsibility*** *to manage the fisheries.* This is because past **government-led** effort has not worked; it has resulted in overfishing and degraded habitats and environment. New government-led initiatives must be **more inclusive** and **more participatory** in orientation, both in decision-making and implementation. Give fishers and stakeholders a **voice** and a **choice.** Develop guidelines with this in mind.
- *The Code and Guidelines based on the Code must meet your country's needs. Emphasis must be placed on solutions, rather than on stating problems again and again. Turn solutions into guidelines.*

Here goes the checklist. **The Code should be**

1. **Practical:** doable/actionable, simple and straightforward, not expensive to adopt/implement.
2. **Accompanied by supplemental livelihood options:** Income-generating activities to diversify sources of present income (from fishing) must be specified. This is partly because guidelines may propose curbs on fishing. What should fishermen do if they can't fish? Other sources of livelihood must be provided.
3. **Accompanied by funding to encourage adoption of guidelines.**

   Who will pay for management, for adoption of the Code? Build and integrate budgetary requirements into the government budget. Try fund-raising at local level. Evolve a self-financing mechanism, if possible and practical
4. **Accompanied by alternatives:** It's not enough to tell the people not to do this or that. We must tell them what they should do. Give them alternatives.
5. **Very specific.** It's not enough to talk about overfishing – spell it out, identify it. What species in coastal waters are being overfished? Detail the catch composition, the size composition, the reproductive condition of the fish. What are the endangered species (if any)?

   What stocks (are being overfished, or are in danger?) Different species or stocks have different population dynamics and production potential.

   What areas (are being overfished?) Nearshore? Offshore? Within the 12 mile territorial seas? Within the 200-mile EEZ? Is it growth overfishing?

   Is it recruitment overfishing?

   Unless we are specific, guidelines too will be general, of little use to the end-users.
6. **Fisheries management today is no more solely about fisheries biology or about stock assessment/population dynamics of the fish stocks BUT about human beings,** about management of fishers more than anything else. Guidelines must therefore be tailored to responsible behaviour to prevent misconduct by fishers and other resource users.
7. **Management so far has been responsive, not pro-active or precautionary. Management has responded to development gone wrong.** We are proposing management today because of overfishing in the past caused by over-crowding and over-capitalisation, because of habitat degradation from pollution and other destructive activities. This approach is wrong. Management should have been precautionary and pro-active. Manage before problems arise.
8. **Existing fisheries acts and legislation must be consulted** in order to develop sound guidelines. The Code of Conduct for Responsible Fisheries and its various articles, provisions and technical guidelines produced by FAO, as well as those produced by SEAFDEC and other institutions, must be studied. Revisions and amendment to existing laws could then be proposed. Our guidelines must be as comprehensive and realistic as possible to be effective.
9. **The proposed guidelines must address salient and key issues.** Fishers will carry out management only if it benefits them, if it is worth their effort.
10. **The proposed guidelines must address the issue of costs and benefits of adoption and non-adoption, and other consequences of non-compliance with management.** Emphasize the benefits:

    Less resource waste, less energy waste.
    Lower costs, higher returns, more profits
    More fish in the future and the distant future
    "Green" fish from managed fisheries
11. **A coordinating mechanism, a co-operative working arrangement among stakeholders, is essential if the guidelines are to be adopted and implemented.** Some institution at the local, district, state or national level must promote the adoption of guidelines. Without such coordination, co-operation among all the stakeholders may not be forthcoming.
12. **The proposed guidelines should be integrated into the existing system of governance, administration and management of coastal areas.**

The fisheries must be integrated into Integrated Coastal Management.

13. **What incentives or disincentives can be provided for greater and wider implementation of the proposed guidelines?** What about disincentives for non-adoption? What are the costs and benefits of adoption?

14. **The proposed guidelines must be prioritised** on the basis of local needs. They should not be just a shopping list.

15. **The proposed guidelines must deal with conflict resolution among the different stakeholders.**

16. **Management must command legal legitimacy.** Without legitimacy in the eyes of the stakeholders, i.e the fishers, as well as severe penalties for violation, compliance may not be high.

17. **The guidelines must be classified by stakeholder type or subject. Example:**

    Guidelines applicable to Fishers
    Guidelines applicable to Government (policy, programme, other instruments)
    Guidelines applicable to Technology
    Guidelines applicable to Resource Base (habitats/ecosystems)
    Guidelines applicable to Other Stakeholders (such as Market Intermediaries, Input Suppliers, Consumers, Bystander Stakeholders)

18. **Reduction of Capacity - how to go about it?**

    Define capacity and its criteria.

    Unit of Measure/Unit of Analysis - in terms of:

    - Number of Fishers
    - Number of Boats
    - Number of Nets/Harvesting Equipment
    - Tonnage (GRT)

19. **What do Guidelines Mean?**

    Personalising responsibility to act or do something about conservation and management. Example:

    Principle: Fishers will take appropriate measures to pursue the ecological sustainability of your country's fisheries

    Guidelines: Develop protocols (including when practical and appropriate, the use of selective fishing gear and practices) regarding the catch of targeted (and non-targeted?) resources which may jeopardise the health of the fisheries stocks

Fisheries management is not about fisheries biology or fish dynamics but about human beings.

Technical Guidelines for Responsible Fisheries

Fishing Operations

The technical guidelines on "fishing operations" are addressed to States, international organizations, fisheries management bodies, owners, managers and charterers of fishing vessels, as well as fishers and their organizations.

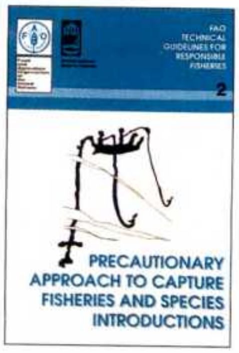
The booklet's immediate objective is to provide practical advice to implement provisions of Article 8 of the Code of Conduct. It contains guidelines for all states (about conditions that ensure responsible fishing – relating, for example, to incomes, health and safety, and systems of education and training), for flag states, for port states. There are guidelines concerning a host of subjects – such as fisheries protection, fishing activities, energy optimization, the design, construction and modification of harbours, the creation of artificial reefs. Half a dozen annexes contain examples of conventions and standard specifications for international vessels, and procedures for development and management of harbours.

A supplement on Vessel Monitoring System (VMS) also forms part of these guidelines.

Precautionary Approach to Capture Fisheries and Species Introductions

The guidelines in this booklet were elaborated by the Technical Consultation on the Precautionary Approach to Capture Fisheries held at Lysekil, Sweden, from 6 to 13 June, 1995. The booklet proposes a definition of the precautionary approach to fisheries as well as an elaboration on the burden of proof. There are detailed guidelines on how to conduct fishery management and research and how to develop and transfer fishery technology in a context of uncertainty.

Guidelines are also provided on species introduction, voluntary or accidental. The guidelines are aimed at governments, fisheries authorities, the fishery industry, regional fishery management bodies, NGOs and other interested parties in order to raise their awareness about the precautionary approach and provide practical guidance on how to apply such precaution.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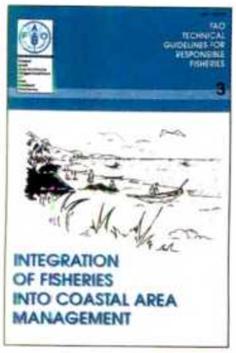
PRECAUTIONARY APPROACH TO CAPTURE FISHERIES AND SPECIES INTRODUCTIONS



Integration of Fisheries into Coastal Area Management

This booklet elaborates Article 10 in the Code of Conduct for Responsible Fisheries, which concerns the integration of fisheries into coastal area management in order to achieve rational use of scarce marine resources. In particular, the booklet addresses the issue of how the fisheries sector can be integrated into coastal management planning -- so that interactions between fisheries and other sectors are taken into account while establishing management policy and practice on coastal resources.

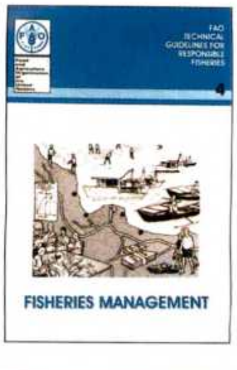
The booklet's Guidelines are addressed to everyone who wants to improve the use of coastal fisheries resources in coastal areas. The Code sets out actions that are required at the national government level, or the level of the authorities responsible for fisheries.

Fisheries Management

This booklet provides a background to the need for fisheries management and an introduction to fisheries management activities. It introduces the major constraints experienced in fisheries and fisheries management, and some fundamental concepts related to these. Biological, environmental, technological, socio-cultural and economic constraints and concepts are examined.

The booklet emphasises the range of data required for informed decision-making on responsible fisheries management. Aspects of the collection and interpretation of data are examined. Data are discussed in terms of three suggested scales in fisheries management: fisheries policy and development planning, formulation of management plans, implementation of management action.

The range of possible management actions is outlined – including technical measures such as gear restrictions and direct approaches such as limiting catch and effort. The booklet stresses the importance of an effective legal framework, institutional structures, and mechanisms for monitoring, control and surveillance.



The FAO has published a series of nine booklets known as "FAO Technical Guidelines for Responsible Fisheries". They are meant to support implementation of the Code of Conduct for Responsible Fisheries, and have been developed in collaboration with member-countries and various organizations. A synopsis of the booklets appears below. Copies of the booklets are available with the FAO in Rome.

Aquaculture Development

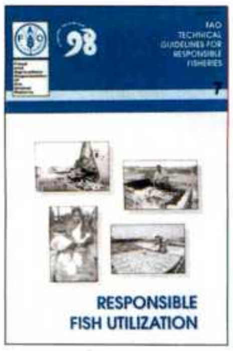
The booklet points out that aquaculture is one of the world's fastest growing food production systems. While the vast majority of aquaculture practices have generated significant social and nutritional benefits, potential social and environmental problems must be addressed to ensure sustainable development.

The booklet provides annotations to the principles of Article 9 of the Code of Conduct for Responsible Fisheries. They are meant to assist those interested in sustainable aquaculture development. The booklet points out that an enabling environment for such development requires fair and responsible attitudes and partnership among a number of players: experts from government and its institutions, social and natural scientists, the media, aquaculture producers and manufacturers, input suppliers, processors and traders in aquaculture products.

Inland Fisheries

Inland fisheries differs from other fisheries in its high degree of inter-relatedness with other users of the aquatic resource. In most areas of the world, the principal impacts on inland fisheries originate not from the fishery itself but from outside it. Implementing the provisions of the Code is therefore a question of negotiation and consultation with other interests.

Explaining the scope of inland fisheries, the booklet points out that it covers fisheries in lakes, reservoirs, swamps, wetlands, rivers and their floodplains. The booklet discusses Articles 6, 7, 9 and 10 of the Code of Conduct (General Principles, Fisheries Management, Aquaculture Development, and Integration of Fisheries into Coastal Area Management respectively), and their relevance and implications for inland fisheries.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FAO TECHNICAL GUIDELINES FOR RESPONSIBLE FISHERIES
7
RESPONSIBLE FISH UTILIZATION

Responsible Fish Utilization

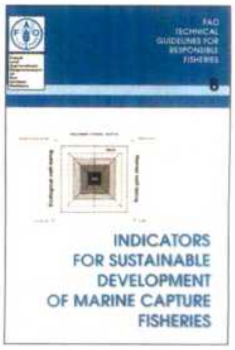
This booklet contains guidelines to help implementation of the Code of Conduct for Responsible Fisheries, and highlights the meaning and implications of the Code for the post-harvest sector of the fish production industry.

The booklet points out that the fish production industry has three major areas of responsibility: to fish consumers, to the fish resource, to the environment. The industry also has a responsibility to itself – to ensure the continued ability of millions of people throughout the world to earn a gainful living from fisheries. These areas of responsibility run through all articles of the Code in one way or another. But Article 11 (Post-Harvest Practices and Trade), highlights the responsibilities to the consumer. This booklet provides annotations and guidance on the provisions of this article.

Indicators for Sustainable Development of Marine Capture Fisheries

The guidelines in this booklet were developed at a special technical consultation organised by Australia's Department of Agriculture, Fisheries and Forestry in close collaboration with the FAO, and held at Brighton Beach, Sydney, Australia, on 18-22 January, 1999. The guidelines relate mainly to Article 7 (Fisheries Management) but also to Article 6 (General Principles), Article 8 (Fishing Operations), Article 10 (Integration of Fisheries into Coastal Area Management), Article 11 (Post-Harvest Practices and Trade) and Article 12 (Research). They clarify why a system of indicators is needed to monitor the contribution of fisheries to sustainable development.

The guidelines outline the process to be followed to establish a Sustainable Development Reference System (SDRS) at the sub-national, national or regional level, focusing on the design of the SDRS, its development and its implementation. The guidelines also highlight a number of issues, related for example to data needs, cost-effectiveness, institutional requirements, capacity-building, and coordination.


FAO TECHNICAL GUIDELINES FOR RESPONSIBLE FISHERIES
8
INDICATORS FOR SUSTAINABLE DEVELOPMENT OF MARINE CAPTURE FISHERIES

Expert Indian Government Panel Recommends Use of Turtle Excluder Devices in Fishing Trawlers

An expert scientific panel of the Government of India has made several recommendations to protect marine turtles in its report submitted to the Government in March 2000. (See box on expert scientific panel, page 32)

An important recommendation concerns the Olive Ridley turtles which nest *en masse* for a few months in the year in the Gahirmatha area in Orissa. The panel says the area should be declared a permanent sanctuary for these turtles, a no-fishing zone for mechanized fishing vessels and gillnetters.

The Olive Ridley is the most common turtle in Indian waters. It is the smallest of sea turtles, measuring about 70 cm in length and weighing about 50 kg. Data collected on Olive Ridley nestings in Gahirmatha, Orissa, between 1976 and 1999, shows that the number of nestings varied from a low of 150,000 in 1976 to a high of 602,000 during January-March 1987. In March 1999 the figure was 340,000. (See box on marine turtles in India).

The panel also suggests sanctuaries to protect marine turtle rookeries in two other areas of Orissa - Rushikulya (a 20-km stretch of the beach northward from the Rushikulya river mouth) and Akashdia island (at the mouth of the Devi river). Fishing by mechanised fishing vessels and gillnetters within a radius of 20 km should be prohibited.

Use of Turtle Excluder Devices

A very important panel recommendation relates to shrimp capture by trawlers. It says that Turtle Excluder Devices (TEDs) should be fitted to mechanised trawlers fishing for shrimp. The use of TEDs should be made mandatory in areas of mass nesting of turtles to reduce the mortality of endangered species of marine turtles and their incidental catch.

The TED measure is partly an outcome of the pro-turtle environmental movement in the United States which has led to curbs on shrimp imports on the ground that shrimp capture leads to incidental capture of turtles. The US State Department and the National Marine Fisheries Service of the US evaluate shrimp fishing in every exporting country. Curbs are imposed on shrimp imports unless shrimp trawlers in the exporting country use TEDs, or provide documentary evidence of a regulatory program on the incidental capture of sea turtles.

Marine Turtles in India

Five of the seven species of marine turtles found worldwide reportedly occur in the Indian coastal waters including the Lakshadweep and Andaman and Nicobar Islands – the Olive Ridley *(Lepidochelys olivacea)*, Green (Chelonca mydas), Hawksbill *(Eretmochelys imbricata)*, leatherback *(Dermochelys coriacea)* and loggerhead *(Caretta caretta)*. All the five species of marine turtles are protected and placed in Schedule I of the Indian Wildlife (Protection) Act, 1972.

TEDs were first introduced to the US shrimp fishery during the late 1980s. Extensive research and development has been undertaken to improve the performance of TEDs. A variety of standard TED designs is available to fishermen today. In India, both Central Institute of Fisheries Technology (CIFT) and Central Institute of Fisheries Nautical Engineering and Training (CIFNET) have been conducting trials and demonstrations with TEDs following the expert panel's recommendations (CIFNET trials took place off the Visakhapatnam coast between October and December 1999. CIFT undertook trials off the coast of Kerala during March 1999.)

The panel says that the TED trials have demonstrated the utility of the exclusion device, but have led to reduced catches, perhaps because of escape of fish. Use of TED may be resisted by subsistence fishermen. It should therefore be made compulsory only in areas where mass nesting takes place. The periodicity of the use of TEDs should be determined by States or Union Territories according to the period of migration of the turtle species in their waters.

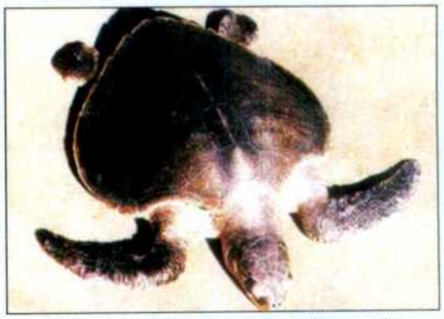
The panel says that management of the marine turtle population in India requires both long-term and short-term management measures.

- habitat preservation of critical nesting areas
- use of TEDs by trawlers in critical nesting areas
- enforcement of turtle conservation laws
- mass awareness, training and extension programmes
- research in frontier areas of marine turtle biology and ecology.

Habitat preservation of critical nesting areas: The panel says that with populations going up, many activities influence changes in the coastal habitat. Examples: littoral drifts causing beach erosion, plantation of secondary forests in areas close to the high tide line, construction of jetties and tourist complexes without adequate environmental impact assessment, and pollution. Planting of casuarina trees close to turtle nesting beaches should be avoided – it results in a decline in the nesting population over a period of time.

This is because the plantations reduce the nesting space available for turtles. Once the trees grow, they change the entire beach soil sub-structure through root growth.

Dermochelys coriacea (Leatherback turtle)



Lepidochelys olivacea (Olive ridley turtle)

Eretmochelys imbricata (Hawksbill turtle)

Caretta caretta (Loggerhead turtle)

Chelonia mydas (Green turtle)

Marine turtle species in Indian waters.

Law enforcement for turtle conservation: There should be better coordination between the forest and wild life departments and the fisheries department of maritime states on enforcement of the Wildlife Protection Act of 1972 and the Marine Fishing Regulation Acts of maritime states. Regular surveillance of areas where mass nesting takes place should be strengthened with the help of the Coast Guard. The Ministry of Agriculture has sanctioned aid for the construction of 26 patrol boats.

Research in frontier areas of marine turtle biology and ecology: Scientific research on sea turtles started in Orissa only about two decades ago, and has been largely confined to the Olive Ridley rookery at Gahirmatha. Biological and ecological research should also be undertaken on other marine turtle nesting beaches along the Orissa coast and the rest of the Indian coast. Since the migratory range of turtles extends to thousands of kilometres across national boundaries and the high seas, India should take part in regional co-operation on the conservation of endangered turtle species.

Mass awareness, training and extension: With the enactment of the Indian Wildlife (Protection) Act, 1972, fishermen refrain from wilfully netting marine turtle species. Because of religious sanctions attached to turtles, its meat is not consumed in coastal states. A survey by the Wildlife Institute of India in 1994 showed that only a few fishermen eat turtle meat; there is hardly any market for it.

But concerted efforts are needed to educate local villagers, fishermen, and fisheries and forest officials about conservation of turtle species. A cadre of volunteers should be created among school children and college youth who can assist government and NGOs in the conservation of endangered species. Organised training courses should be conducted on marine turtle conservation for all field and extension officers.

A workshop on turtle excluder devices organised by Orissa's Department of Fisheries was held at Paradip from 11 to 14 November, 1996, in co-operation with the US National Marine Fisheries Service. The 4-day programme included a practical demonstration of TED operations at sea, on-board training in the manufacture, installation and maintenance of TEDs, and coaching of trawler owners and operators, fish net makers, government officials, scientific personnel and NGOs. A second workshop on TEDs was organised by MPEDA, Kochi, during 5-6 May, 1997, again in partnership with the NMFS.

To popularise the use of TEDs, the expert scientific panel suggests that such workshops should be organised in all the Coastal States and Union Territories with the active participation of expert institutions.

Expert Scientific Panel on TEDs

In November 1997, the Marine Products Export Development Authority (MPEDA) constituted a committee of experts to assess the economic gain or loss from installation of TEDs in shrimp trawl nets. The Committee recommended that an Expert Scientific Panel (ESP) be set up to conduct a detailed study. The Government agreed and constituted the panel on July 10, 1998.

The Fisheries Development Commissioner was to act as member-convenor of the panel. Other members included the heads of various research institutes – the Central Marine Fisheries Research Institute or CMFRI, Kochi; the Fisheries Survey of India, Bombay; the Central Institute of Fisheries Technology or CIFT, Kochi; the Central Institute of Fisheries Nautical and Engineering Training (CIFNET), Kochi; and a representative of the Wildlife Institute of India, Dehra Dun.

The terms of reference of the panel covered the following subjects:

- Distribution of sea turtle species in Indian waters
- Incidental catch of sea turtles by trawl nets, gillnets etc.
- Study on the mortality of sea turtles due to factors other than fishing
- Trials/demonstrations on the efficacy of established TED models
- Loss of catch through the use of TEDs in trawl nets (cost-benefit analysis)
- Management measures for conservation of marine turtle species along the coastline of the mainland and the islands.

The Director, CMFRI, Kochi, was to coordinate the study. CIFNET and CIFT, Kochi,would be responsible for fabricating TEDs and conducting trials with TEDs. The Report of the ESP was prepared by Dr Y S Yadava, then Fisheries Development Commissioner and Member-Convenor of the ESP.

Sri Lanka's Minister for Fisheries

Mr. Mahinda Rajapaksa (right) has been appointed to a second term as Sri Lanka's Minister for Fisheries and Aquatic Resources Development by the country's President, Mrs. Chandrika Kumaratunga. After assuming office, he urged officials of the Ministry to pay more attention to the management of fisheries and aquatic resources, and strive for efficient implementation of a new six-year plan of action.

Mr. Rajapaksa said a number of measures would be taken by the Ministry to modernize the fisheries infrastructure, protect the environment, better the quality of fish, improve the nutrition standards of the population, and strengthen the welfare of fishing communities.

During his first term, Mr. Rajapaksa was instrumental in expanding the programmes of the Department of Fisheries and in introducing the Aquaculture Act. This first term also saw a number of programmes for the upliftment of the socio-economic status of small-scale fishing communities in Sri Lanka. It was Mr. Rajapaksa who represented Sri Lanka at the 1995 FAO Conference where the Code of Conduct for Responsible Fishing came into being. He moved a motion for early implementation of the programme.

BAY OF
BENGAL
NEWS

Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional multi-agency fisheries programme which covers seven countries around the Bay of Bengal – Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The programme plays a catalytic and consultative role: it develops, demonstrates and promotes new methodologies, techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in the member countries. The BOBP is sponsored by the governments of Denmark and Japan, and by member governments in the Bay of Bengal region. The main executing agency is the FAO (Food and Agriculture Organization of the United Nations)

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